

FIRST YEAR

Common Scheme and Syllabus

for

**All Bachelor of Technology Programmes of Study
under the aegis of University School of Information,
Communication & Technology offered at Affiliated
Institutions of the University**

In light of the eligibility condition specified in the **AICTE Process Handbook 2022-23** (Page Nos 89 and 90), the **Chemistry Papers BS-121 / BS-120 entitled “Basic Chemistry”** shall be offered to students admitted from Academic Session 2022-23 (in the 1st/ 2nd Semester) in lieu of **Chemistry Papers BS-103 / BS-104 entitled “Applied Chemistry”**. This shall be offered only to students who have not studied Chemistry at 10+2 Level and are admitted to the following disciplines only:

- 1) Computer Science and Engineering (CSE)
- 2) Information Technology (IT)
- 3) Computer Science and Technology (CST)
- 4) Information Technology and Engineering (ITE)
- 5) Electronics and Communications Engineering (ECE)
- 6) Electrical Engineering (EE)
- 7) Electrical and Electronics Engineering (EEE)
- 8) Instrumentation and Control Engineering (ICE)
- 9) Computer Science and Engineering (Artificial Intelligence) (CSE-AI)
- 10) Computer Science and Engineering (Artificial Intelligence and Machine Learning) (CSE-AIML)
- 11) Computer Science and Engineering (Data Science) (CSE-DS)
- 12) Computer Science and Engineering (Internet of Things) (CSE-IoT)
- 13) Computer Science and Engineering (Internet of Things and Cyber Security including Block Chain Technology) (CSE-ICB)
- 14) Computer Science and Engineering (Networks) (CSE-Net)
- 15) Computer Science and Engineering (Cyber Security) (CSE-CS)
- 16) Electronics Engineering (VLSI Design and Technology) (EE-VDT)
- 17) Electronics and Communication (Advanced Communication Technology) (EC-ACT)

Note: The corresponding practical paper (BS-155 / BS-156) shall be unchanged.(Addition from AY 2022-23)

First Semester					
Group	Code	Paper	L	P	Credits
Theory Papers					
ES BS	ES-101 BS-103/BS-121 [#]	*Any one of the following: Programming in 'C' Applied Chemistry / Basic Chemistry [#]	3	-	3
BS	BS-105	Applied Physics – I	3	-	3
ES BS	ES-107 BS-109	*Any one of the following: Electrical Science Environmental Studies	3	-	3
BS	BS-111	Applied Mathematics – I	4	-	4
HS	HS-113	**Group 1 or Group 2 shall be offered: Group 1: Communications Skills OR Group 2:	3	-	3
HS	HS-115	Indian Constitution***	2		2
HS	HS-117	Human Values and Ethics***	1		1
ES	ES-119	Manufacturing Process	4	-	4
Practical/Viva Voce					
BS	BS-151	Physics-I Lab	-	2	1
ES BS	ES-153 BS-155	Any of the following corresponding to the theory paper offered: Programming in 'C' Lab Applied Chemistry	-	2	1
ES	ES-157	Engineering Graphics-I	-	4	2
ES BS	ES-159 BS-161	Any of the following corresponding to the theory paper offered: Electrical Science Lab Environmental Studies Lab	-	2	1
Total			20	10	25

*For a particular batch of a programme of study one out of these two papers shall be taught in the first semester while the other shall be taught in the 2nd semester. Students who have to re-appear can only reappear in the odd semester if originally offered to the student in the 1st semester and similarly for the students who study the paper in the second semester. The institution shall decide which paper to offer in which semester.

**For a particular batch of a programme of study either the paper on “Communications Skills” (Group 1), or Group 2: papers (“Indian Constitution” and “Human values and ethics”) shall be taught in the first semester while the other group shall be taught in the 2nd semester. Students who have to re-appear can only reappear in the odd semester if originally offered to the student in the 1st semester and similarly for the students who study the paper(s) in the second semester. The institution shall decide which paper group to offer in which semester.

*****NUES:** All examinations to be conducted by the concerned teacher as specified in the detailed syllabus of the paper.

#The students who have not studied Chemistry at 10+2 level shall be offered BS-121 in lieu of BS-103, as applicable in applicable disciplines. (Addition from the Academic Session 2022-23)

Group	Code	Paper	L	P	Credits
HS/MS	HS-352	NSS / NCC / Cultural Clubs / Technical Society / Technical Club*			2

***NUES:** Comprehensive evaluation of the students by the concerned coordinator of NCC / NSS / Cultural Clubs / Technical Society / Technical Clubs, out of 100 as per the evaluation schemes worked out by these activity societies, organizations; the co-ordinators shall be responsible for the evaluation of the same. These activities shall start from the 1st semester and the evaluation shall be conducted at the end of the 6th semester for students admitted in the first semester. Students admitted in the 2nd year (3rd semester) as lateral entry shall undergo training or participate in the activities for the period of 3rd semester to 6th semester only

Second Semester					
Group	Paper Code	Paper	L	P	Credits
Theory Papers					
ES BS	ES-102 BS-104/BS-120 [#]	*Any one of the following: Programming in ‘C’ Applied Chemistry / Basic Chemistry [#]	3	-	3
BS	BS-106	Applied Physics – II	3	-	3
ES BS	ES-108 BS-110	*Any one of the following: Electrical Science Environmental Studies	3	-	3
BS	BS-112	Applied Mathematics – II	4	-	4
HS	HS-114	**Group 1 or Group 2 shall be offered: Group 1: Communications Skills OR	3	-	3
HS	HS-116	Group 2: Indian Constitution***	2		2
HS	HS-118	Human Values and Ethics***	1		1
ES	ES-114	Engineering Mechanics	3	-	3
Practical/Viva Voce					
BS	BS-152	Physics-II Lab	-	2	1
ES BS	ES-154 BS-156	*Any of the following corresponding to the theory paper offered: Programming in ‘C’ Lab Applied Chemistry	-	2	1
ES	ES-158	Engineering Graphics-II	-	2	1
ES BS	ES-160 BS-162	*Any of the following corresponding to the theory paper offered: Electrical Science Lab Environmental Studies Lab	-	2	1
ES	ES-164	Workshop Practice		4	2
Total			19	12	25

*For a particular batch of a programme of study one out of these two papers shall be taught in the first semester while the other shall be taught in the 2nd semester. Students who have to re-appear can only reappear in the odd semester if originally offered to the student in the 1st semester and similarly for the students who study the paper in the second semester. The institution shall decide which paper to offer in which semester.

**For a particular batch of a programme of study either the paper on “Communications Skills” (Group 1), or Group 2: papers (“Indian Constitution” and “Human values and ethics”) shall be taught in the first semester while the other group shall be taught in the 2nd semester. Students who have to re-appear can only reappear in the odd semester if originally offered to the student in the 1st semester and similarly for the students who study the paper(s) in the second semester. The institution shall decide which paper group to offer in which semester.

*****NUES:** All examinations to be conducted by the concerned teacher as specified in the detailed syllabus of the paper.

#The students who have not studied Chemistry at 10+2 level shall be offered BS-120 in lieu of BS-104, as applicable in applicable disciplines. (Addition from the Academic Session 2022-23)

BRIDGE COURSES FOR THE B.TECH LATERAL ENTRY STUDENTS

All the Lateral Entry students of B.Tech., who are directly admitted in the 2nd Year / 3rd Semester of the Programme of Study, have to pass the following bridge courses.

Paper Code	Paper Name	L/P
BC-181	Bridge Course in Mathematics	3
BC-183	Bridge Course in Programming in C	3

Implementation Rules for Bridge Courses:

1. The institutions are required to conduct the classes for the above bridge courses in the 3rd Semester along with the classes of the other courses.
2. These papers have to be qualified by the students.
3. For these papers examination shall be conducted by the concerned subject teacher as NUES, the same shall be transferred to Examination Division of the University.
4. The degree to be awarded to the student only subject to the acquiring qualifying grade/marks in the bridge courses and the minimum credits in the regular courses of the scheme of study as prescribed.
5. These Courses shall be qualifying in nature; they shall not be included for calculation of CGPA. The qualifying marks shall be 40 marks in each paper.
6. A separate marksheet will be issued by the Examination Division of the University for the Bridge Course.

**Bachelor of Technology in Computer Science and Engineering
(CSE)**
2nd Year Onward Scheme and implementation guideline

Third Semester					
Group	Paper Code	Paper	L	P	Credits
Theory Papers					
ES	ES-201	Computational Methods	4		4
HS/MS	HS-203	Indian Knowledge System*	2		2
PC	CIC-205	Discrete Mathematics	4		4
PC	ECC-207	Digital Logic and Computer Design	4		4
PC	CIC-209	Data Structures	4		4
PC	CIC-211	Object-Oriented Programming using C++	4		4
Practical / Viva Voce					
ES	ES-251	Computational Methods Lab		2	1
PC	ECC-253	Digital Logic and Computer Design Lab		2	1
PC	CIC-255	Data Structures Lab		2	1
PC	CIC-257	Object-Oriented Programming using C++ Lab		2	1
Total			22	8	26

***NUES:**All examinations to be conducted by the concerned teacher as specified in the detailed syllabus of the paper.

Fourth Semester					
Group	Paper Code	Paper	L	P	Credits
Theory Papers					
BS	BS-202	Probability, Statistics and Linear Programming	4		4
HS/MS	HS-204	Technical Writing*	2		2
PC	CIC-206	Theory of Computation	4		4
PC	EEC-208	Circuits and Systems	4		4
PC	CIC-210	Database Management Systems	4		4
PC	CIC-212	Programming in Java	4		4
Practical / Viva Voce					
BS	BS-252	Probability, Statistics and Linear Programming Lab		2	1
PC	EEC-254	Circuits and Systems Lab		2	1
PC	CIC-256	Database Management Systems Lab		2	1
PC	CIC-258	Programming in Java Lab		2	1
Total			22	8	26

***NUES:**All examinations to be conducted by the concerned teacher as specified in the detailed syllabus of the paper.

Fifth Semester					
Group	Paper Code	Paper	L	P	Credits
Theory Papers					
HS/MS	HS-301	Economics for Engineers	2		2
PC	CIC-303	Compiler Design	3		3
PC	CIC-305	Operating Systems	4		4
PC	CIC-307	Computer Networks	4		4
PC	CIC-309	Software Engineering	3		3
PC	CIC-311	Design and Analysis of Algorithm	4		4
Practical / Viva Voce					
PC	CIC-351	Compiler Design Lab		2	1
PC	CIC-353	Operating Systems Lab		2	1
PC	CIC-355	Computer Networks Lab		2	1
PC	CIC-357	Software Engineering Lab		2	1
PC	CIC-359	Design and Analysis of Algorithm Lab		2	1
PC / Internship	ES-361	Summer Training Report - 1 *			1
Total		-	20	10	26

***NUES:**Comprehensive evaluation of the Summer Training Report – 1 (after 4th Semester) shall be done by the committee of teachers, constituted by the Academic Programme Committee, out of 100. The training shall be of 4 to 6 weeks duration. The training can be under the mentorship of a teacher of the institute.

Sixth Semester					
Group	Paper Code	Paper	L	P	Credits
Theory Papers					
HS/MS	MS-302	Principles of Management for Engineers	3		3
HS/MS	HS-304	Universal Human Values*	1		1
PCE		Programme Core Elective Paper (PCE –1)			4
PCE		Programme Core Elective Paper (PCE – 2)			4
PCE		Programme Core Elective Paper (PCE – 3)			4
EAE / OAE		Emerging Area/Open Area Elective Paper (EAE – 1 /OAE – 1)			4
EAE / OAE		Emerging Area/Open Area Elective Paper (EAE – 2 /OAE – 2)			4
Practical / Viva Voce					
HS/MS	HS-352	NSS / NCC / Cultural Clubs / Technical Society / Technical Club**			2
Total					26

***NUES:**All examinations to be conducted by the concerned teacher as specified in the detailed syllabus of the paper.

****NUES:**Comprehensive evaluation of the students by the concerned coordinator of NCC / NSS / Cultural Clubs / Technical Society / Technical Clubs, out of 100 as per the evaluation schemes worked out by these activity societies, organizations; the faculty co-ordinators shall be responsible for the evaluation of the same. These activities shall start from the 1st semester and the evaluation shall be conducted at the end of the 6th semester for students admitted in the first semester. Students admitted in the 2nd year (3rd semester) as lateral entry shall be evaluated on the basis their performance, by the faculty co-ordinator for the period of 3rd semester to 6th semester only.

Seventh Semester					
Group	Paper Code	Paper	L	P	Credits
Theory Papers					
HS/MS	MS-401	Principles of Entrepreneurship Mindset	2		2
PCE		Programme Core Elective Paper (PCE – 4)			4
PCE		Programme Core Elective Paper (PCE – 5)			4
EAE / OAE		Emerging Area / Open Area Elective Paper (EAE – 3 / OAE – 3)			4
EAE / OAE		Emerging Area / Open Area Elective Paper (EAE – 4 / OAE – 4)			4
EAE / OAE		Emerging Area / Open Area Elective Paper (EAE – 5 / OAE – 5)			4
Practical / Viva Voce					
PC / Project	ES-451	Minor Project**			3
PC / Internship	ES-453	Summer Training Report - 2 *			1
Total					26

***NUES:** Comprehensive evaluation of the Summer Training Report – 2 (after 6th Semester) shall be done by the committee of teachers, constituted by the Academic Programme Committee, out of 100. The training shall be of 4 to 6 weeks duration. The training can be under the mentorship of a teacher of the institute.

******The student shall be allocated a supervisor / guide for project work at the end 6th semester by the department / institution, the project shall continue into the 8th semester. In the 7th semester evaluation, the criteria for evaluation shall be conceptualization of the project work, the background study / literature survey and identification of objectives and methodology to be followed for project. 40 marks evaluation for the Teachers' Continuous Evaluation / Internal Assessment shall be done by concerned supervisor while the term end examination of 60 marks shall be conducted by the supervisor concerned and the external examiner deputed by the Examinations Division. In the absence of the supervisor, the Director of the Institution / Head of the Department can assign the responsibility of the supervisor (for purpose of examinations) to any faculty of the Institution / Department.

Eight Semester					
Group	Paper Code	Paper	L	P	Credits
Practical / Viva Voce[%]					
PC / Project	ES-452	Major Project – Dissertation and Viva Voce [#]			18
	ES-454	Project Progress Evaluation*			2
PC / Internship	ES-456	Internship Report and Viva Voce [#]			18
	ES-458	Internship Progress Evaluation*			2
Total			0	0	20

***NUES:** Comprehensive evaluation by the committee of teachers, constituted by the Academic Programme Committee, out of 100.

%By default every student shall do the project work (ES-452 and ES-454). A student shall either be allowed to do a project work (ES-452 and ES-454) or an internship (ES-456 and ES-458). The student must apply for approval to do internship before the commencement of the 8th semester to the institute, and only after approval of Principal / Director of the institute through Training and Placement Officer of the institute, shall proceed for internship.

#Students may be allowed to do internship in this semester in lieu of Major project. The students allowed to proceed for internship shall be required to maintain a log-book of activities performed during internship. The same has to be countersigned by the mentor at the organization where internship is completed.

ES-452: Evaluation shall be conducted of 40 marks (Teachers' continuous evaluation / internal assessment) by the supervisor. And, 60 marks by a bench of the supervisor and the external examiner deputed by Examination Division (COE), for a total of 100 marks.

ES-454 / ES-458: Comprehensive evaluation by the committee of teachers, constituted by the Academic Programme Committee, out of 100.

ES-456: Evaluation shall be conducted of 40 marks (Teachers' continuous evaluation / internal assessment) by the Training and Placement Officer of the department / institute on the basis of the report submitted by the student. And, 60 marks by a bench of the Training and Placement Officer of the department / institute and the external examiner deputed by Examination Division (COE), for a total of 100 marks.

In the absence of the supervisor or the Training and Placement Officer (as the case may be), the Director of the institute / Head of the Department can assign the responsibility of the supervisor or the Training and Placement Officer (for purpose of examinations) to any faculty of the department.

Note on Elective Papers: The elective papers shall be allowed to be taken / studied by the students, by the APC of the department / institute, keeping in view that two papers studied by the student should not have a substantial overlap. All papers studied by the student should be substantially distinct in content.

Note on Examination of Elective Papers:

- (a) Papers with only theory component shall have 25 Marks continuous evaluation by the teacher and 75 Marks term-end examinations. Both these component marks shall be reflected on the marksheet of the student.
- (b) Papers with only practical component shall have 40 Marks continuous evaluation by the teacher and 60 Marks term-end examinations. Both these component marks shall be reflected on the marksheet of the student.

Note on Continuous Evaluation of All Papers:

- (a) Papers with only theory component shall have 25 Marks continuous evaluation by the teacher which shall be evaluated as:
 - i. Mid-Term Test* - 15 Marks (after 8 weeks of teaching or as decided by PCC)
 - ii. Assignments / Project / Quiz / Case Studies, etc. - 5 Marks
 - iii. Attendance / Class Participation - 5 Marks
- (b) Papers with only practical component shall have 40 Marks continuous evaluation by the teacher which shall be evaluated as:
 - i. Mid-Term Test and Viva Voce - 20 Marks (after 8 weeks of teaching or as decided by PCC)
 - ii. Practical File - 10 Marks
 - iii. Attendance / Lab Participation - 10 Marks

*** The mid-term test shall be coordinated by the Programme Coordination Committee.**

If a student could not appear for a mid-term test due to situation beyond the control by the student, a supplementary test may be arranged towards the end of the semester, in a similar manner to the mid-term test for such students. The students must apply for this provision to the department / institution. On examination of the reason for non-appearing in the mid-term test by the Head of the Department / Institute, and with reason for allowing to appear in the supplementary test to recorded by the Head of the Department / Institute, the student may be allowed.

The attendance sheets, the question papers and the award sheets for the continuous evaluation to be retained by the concerned department / institute for at least 6 months after the declaration of the result by the Examination Division of the University.

Programme Core Electives

Semester	Paper Code	PCE – 1 (Choose Any One)	L	P	Credits
6	CIE-306T	Advanced Java Programming	3		3
	CIE-306P	Advanced Java Programming Lab		2	1
6	CIE-308T	Visual Basic.NET Programming	3		3
	CIE-308P	Visual Basic.NET Programming Lab		2	1
6	CIE-312	Engineering Optimization	4		4
6	CIE-320	Principles of Programming Languages	4		4
6	CIE-322T	Simulation and Modelling	3		3
	CIE-322P	Simulation and Modelling Lab		2	1
Semester	Paper Code	PCE – 2 (Choose Any One)	L	P	Credits
6	CIE-330T	Introduction to Internet of Things	3		3
	CIE-330P	Introduction to Internet of Things Lab		2	1
6	CIE-332T	Programming in Python	3		3
	CIE-332P	Programming in Python Lab		2	1
6	CIE-334	Quantum Computing	4		4
6	CIE-338T	Graph Theory for Computer Science	3		3
	CIE-338P	Graph Theory for Computer Science Lab		2	1
6	CIE-348T	Software Project Management	3		3
	CIE-348P	Software Project Management Lab		2	1
Semester	Paper Code	PCE – 3 (Choose Any One)	L	P	Credits
6	CIE-354T	Introduction to Digital Signal Processing	3		3
	CIE-354P	Introduction to Digital Signal Processing Lab		2	1
6	CIE-356T	Web Technologies	3		3
	CIE-356P	Web Technologies Lab		2	1
6	CIE-368T	Mobile Computing	3		3
	CIE-368P	Mobile Computing Lab		2	1
6	CIE-370T	Parallel Computing	3		3
	CIE-370P	Parallel Computing Lab		2	1
6	CIE-374T	Artificial Intelligence	3		3
	CIE-374P	Artificial Intelligence Lab		2	1
Semester	Paper Code	PCE – 4 (Choose Any One)	L	P	Credits
7	CIE-403T	Blockchain Technology	3		3
	CIE-403P	Blockchain Technology Lab		2	1
7	CIE-405T	Data Science	3		3
	CIE-405P	Data Science Lab		2	1
7	CIE-407T	Distributed Systems and Cloud Computing	3		3
	CIE-407P	Distributed Systems and Cloud Computing Lab		2	1
7	CIE-409T	Social Network Analysis and Sentiment Analysis	3		3
	CIE-409P	Social Network Analysis and Sentiment Analysis Lab		2	1
7	CIE-413T	Next Generation Web	3		3
	CIE-413P	Next Generation Web Lab		2	1
Semester	Paper Code	PCE – 5 (Choose Any One)	L	P	Credits
7	CIE-417T	C#.NET Programming	3		3
	CIE-417P	C#.NET Programming Lab		2	1
7	CIE-419	Intellectual Property Rights	4		4
7	CIE-421T	Machine Learning	3		3
	CIE-421P	Machine Learning Lab		2	1
7	CIE-425T	Data Warehousing and Data Mining	3		3
	CIE-425P	Data Warehousing and Data Mining Lab		2	1
7	CIE-431T	Web Mining	3		3
	CIE-431P	Web Mining Lab		2	1

Note:

1. An elective shall be offered to the student for each PCE group (That is for PCE-1, PCE-2, etc.) based on the availability of resources and faculty at the institution and at least one third of the batch or at least 20 students must be willing to take the elective. At least two elective per PCE group must be offered to the students of the major discipline.
2. Each PCE slot is of 4 credits, if in a particular slot, the paper has no practical component, then it is of 4 credits (a pure theory paper), otherwise for purpose of examination and conduct of classes, the course is split in two papers, namely a theory paper of 3 credits and a practical paper of 1 credit. The student has to study for 4 credits per slot of PCE group. This is reflected by suffixing the paper code by T (for Theory component) and P (for Practical component), if required.

Implementation Rules:

- The examinations, attendance criteria to appear in examinations, promotion and award of the degree shall be governed by the Ordinance 11 of the University.** The term “major discipline” / “primary discipline” in this document refers to the discipline in which student is admitted / studies from 3rd semester onwards. However credits of courses / paper for OAE / EAE groups shall not be considered for the purpose of promotion from one year of study to the subsequent year of study.
- Minimum duration** of the Bachelor of Technology programme shall be 4 years (N=4 years) (8 semesters) for the students admitted in the 1st year and 1st semester of the degree programme. Lateral entry students shall be admitted in the 2nd year and 3rd semester of the degree programme (effectively in the batch admitted in the first year in the previous academic session and shall be deemed to have been exempted from the courses / papers of the first year of the degree programme. No exemption certificate shall be issued in any case.
A specific lateral entry students’ minimum duration shall be the same as the minimum duration for the batch in which he/she is admitted as a lateral entry student in the 2nd year.
- Maximum duration of the Bachelor of Technology programme shall be 6 years (N+2 years).** After completion of N+2 years of study, if the student has appeared in the papers of all the semesters upto 8th semester, then a maximum extension of 1 year may be given to the student for completing the requirements of the degree if and only if the number of credits already earned by the student is atleast 150 (for lateral entry students it shall be at least 102 credits) from the (non-honours components). Otherwise, the admission of the student shall stand cancelled. After the period of allowed study, the admission of the student shall be cancelled.
A specific lateral entry students’ maximum duration shall be the same as the minimum duration for the batch in which he/she is admitted as a lateral entry student in the 2nd year.
- The degree shall be awarded only after the fulfilment of all requirements of the Scheme and Syllabus of Examinations and the applicable Ordinance.**
- (a) The students shall undergo the following group of Courses / Papers as enumerated in the scheme (**For the students admitted in the First Year / First Semester**).

Group	Semester (Credits)							Total Credits	Mandatory Credits
	I & II	III	IV	V	VI	VII	VIII		
BS	24		5					29	14
HS/MS	6	2	2	2	6	2		20	10
ES	20	5						25	15
PC		19	19	24		4	20	86	76
PCE					12	8		20	16
EAE/OAE					8	12		20	16
Total	50	26	26	26	26	26	20	200	147

TABLE 1: Distribution of Credits (Project / Internship credits are 25 out the 86 credits for Programme Core (PC) credits, while extra-curricular activities credits are 2 out of 20 credits for Humanities / Management / Social Science Group (HS/MS)) . This table is for students admitted in the First Year / First Semester of the Degree Programme.

(b) The students admitted as Lateral Entry shall undergo the following group of Courses / Papers as enumerated in the scheme.

Group	Semester (Credits)						Total Credits	Mandatory Credits
	III	IV	V	VI	VII	VIII		
BS		5					5	0
HS/MS	2	2	2	6	2		14	7
ES	5						5	0
PC	19	19	24		4	20	86	76
PCE				12	8		20	16
EAE/OAE				8	12		20	16
Total	26	26	26	26	26	20	150	115

TABLE 2: Distribution of Credits (Project / Internship credits are 25 out the 86 credits for Programme Core (PC) credits, while extra-curricular activities credits are 2 out of 14 credits for Humanities / Management / Social Science Group (HS/MS)) This table is for students admitted as Lateral Entry Students in the Second Year / Third Semester of the Degree Programme.

- Mandatory Credits specify the number of credits from each subject group to be mandatorily acquired by the student for the award of the degree, for students admitted as students in the 1st year and 1st semester of the degree programme. While for students admitted as lateral entry in the 2nd year and 3rd semester the Mandatory Credits value is 115, and specify the number of credits from each subject group to be mandatorily acquired by the student for the award of the degree (Table 2). See clause 11 and 12 also.
- Some of the papers are droppable in the sense that the student may qualify for the award of the degree even when the student has not cleared / passed some of the papers of these group. However, the student has to earn the minimum credits for the programme of study as specified. **See clause 11 and 12 also.**
- The students may take 5 subjects from EAE / OAE groups. The open electives of the OAE group of courses may also be taken through SWAYAM / NPTEL MOOCs platform. The student desirous of doing a MOOC based course among the OAE group must seek approval of the APC of the institute for the same before the commencement of the semester. The APC shall allow the MOOC based OAE option to the student if and only if the MOOC subject / course being considered for the student is being offered in line with the Academic Calendar applicable. The student shall submit the successful completion certificate with marks to the institution for onwards transfer to the Examination Division. The Examinations Division shall take these marks on record for incorporation in the result of the appropriate semester. These marks / grades of these courses shall be used for calculation of the SGPA/CGPA of the student concerned by the examination division of the University. **If a student takes even one OAE paper through MOOCs, then the student shall not be eligible for minor specialization.** The degree to the student on fulfilment of other requirements for such cases shall be through **clause 12.b. or 12.c.**

These MOOC courses taken by the students, if allowed by the APC of the institute shall be of 4 credits or more collectively to be against or for one paper slot in the scheme, through MOOCs, though the marks shall be shown individually. That is in one paper slot in the scheme wherever a MOOC course is allowed, the student may register for more than one paper to aggregate 4 credits or more. **If the credits of these MOOC Courses, allowed to a student is more than 4, then the maximum credit for the programme shall be amended accordingly for the particular student.** Also, in a particular semester, a student may take more than one MOOC course with the approval of the APC to meet the credit requirements of OAE for the semester. The cost of taking the MOOC course is to be borne by the concerned student. The results of the MOOC courses shall be declared separately by the Examination Division from the result for the papers conducted by the examination division of the University.

- To earn an Honours degree, the student may enrol for 20 credits or more through SWAYAM / NPTEL MOOCs platform. This point has to be read together with other points specially point 13 and 14. The acquisition of the credits should be completed before the 15th of the July of the Admission Year plus 4 years. That is, if a

student is admitted in the year X, then these credits must be acquired through MOOCs by 15th July of the year (X+4), no extra duration or time shall be allocated, this means, the student must submit the result of such papers on or before 15th July of the Admission Year plus 4 years.

Honours in the degree shall be awarded if and only if at least 20 credits are acquired through MOOCs. To obtain Honours in the programme, the student must apply to the institution about the same before the commencement of the 5th semester. The specific courses through MOOCs shall be registered by the student only after approval by the Academic Programme Committee (APC) of the Institute. The APC shall approve the course if it is not already studied by the student or the student shall not study it in future and adds value to the major area of specialization (which is the degree). The papers for which the student desires to appear for Honours through MOOCs, all papers results shall be submitted by the student to the Institute for onwards transfer to Examination Division of the University, to be taken on record of the University. The results of these papers shall be a part of the records of the examinations of the students. The records shall be submitted by the student to the Institute, then transferred to the Examination Division, shall be notified by the Examination Division of the University, and a separate marksheets shall be issued by the Examination Division. The cost of taking the MOOC course is to be borne by the concerned student. Such courses shall be reflected as additional courses / papers for the student.

If a student acquires less than 20 credits through MOOCs, following the mechanism specified, then also the results of these papers shall be taken on record as specified above, though no Honours degree shall be awarded.

The papers through MOOCs for Honours degree shall not be a part of the set of the papers over which the SGPA / CGPA of the student shall be calculated.

The papers through MOOCs for Honours degree shall be additional papers studied by the students and are to be taken into account only for award of Honours in the degree programme, if 20 credits are earned through MOOCs as approved by APC, by a student. **See Clause 13 also.**

10. Maximum Credits is at least 200 (Table 1) for students admitted in the 1st year and 1st semester, these are the credits for which the student shall have to study for the non-Honours component of the curriculum. And, for lateral entry students admitted in the 2nd year and 3rd semester of the degree programme, the maximum credit required to be studied is at least 150 (Table 2). **See clause 8 also.**

The student has to appear in the examinations for these credits in all components of evaluation as specified in the scheme of studies.

11. Minimum Credits required to be earned is atleast 180 (out of the 200 non Honours papers credits, see clause 10 also) for students admitted in the 1st year and 1st semester. And, for lateral entry students admitted in the 2nd year and 3rd semester of the degree programme, the minimum credit required to be earned is at least 135 (out of the 150 non Honours papers credits, see clause 10 also). See clause 6 also.
12. The following degree route can be taken by a student (**also refer point 13**):
 - a. The students shall be awarded one minor specialization, one from EAE/OEA route under the following conditions:
 - i. The student has earned the mandatory credits as defined in Table 1 or Table 2 (as applicable) and clause 6.
 - ii. The student earns 20 credits from one group of EAE / OAE courses offered as a minor specialization by the institute.
 - iii. In addition, the total credits (including the above specified credits) earned by the student is atleast as **specified in clause 11.**

The degree nomenclature of the degree shall be as: **"Bachelor of Technology in Computer Science and Engineering with Minor Specializations in <concerned EAE/OAE discipline>"**; if criteria / **point 9** is not satisfied for Honours. Otherwise, if criteria / **point 9** is met, then the degree shall be an Honours degree and the nomenclature shall be as: **"Bachelor of Technology in Computer Science and Engineering with Minor Specializations in <concerned EAE/OAE discipline> (Honours)"**, if in addition to **point 12.a.i, 12.a.ii, and 12.a.iii**, the student fulfils the criteria for Honours as specified at **point 9**.

- b. The students shall be awarded the degree without any minor specialization under the following conditions:
 - i. The student has earned the mandatory credits as defined in **Table 1** or **Table 2** (as applicable) and **clause 6**.
 - ii. In addition, the total credits (including the above specified credits) earned by the student is atleast as specified in **clause 11**.

The degree nomenclature of the degree shall be as: **“Bachelor of Technology in Computer Science and Engineering”**; if criteria / **point 9** is not satisfied for Honours. Otherwise, if criteria / **point 9** is met, then the degrees shall be an Honours degree and the nomenclature shall be as: **“Bachelor of Technology in Computer Science and Engineering (Honours)”**, if in addition to **point 12.b.i** and **12.b.ii**, the student fulfils the criteria for Honours as specified at **point 9**.

- c. If the student does not fulfil any of the above criterions (**point 12.a, or 12.b**), if the student earns at least the minimum credits specified in clause 11 (disregarding the mandatory credits clause of **Table 1 or Table 2 (as applicable) and Clause 6**), then the student shall be award the degree as **“Bachelor of Technology in Computer Science and Engineering”**. Such students shall not be eligible for the award of an Honours degree. Though, if credits are accumulated through MOOCs as per **clause 9**, the same shall be reflected in the marksheets of the students.
- 13. **The Honours degree shall only be awarded if the CGPA of the student is above or equal to 7.5 in addition to fulfilment of criteria / point 10 and 13 above and the degree is awarded after the immediate completion of the 4th year of the batch from the year of admission.** No Honours shall be conferred if the degree requirements are not completed in the minimum duration.
 - 14. **Pass marks in every paper shall be 40.**
 - 15. **Grading System shall be as per Ordinance 11 of the University.**
 - 16. The Programme Core Electives (PCE) shall be specific to a major discipline, minor specializations and papers for EAE shall be defined by the school defining the syllabus for the particular areas and minor specializations and papers for OAE shall be defined by the schools defining the elective streams.
 - 17. **Minor specialization in non-engineering disciplines may be offered under the aegis of the other schools (provided the individual institutions are offering programmes under the aegis of the school offering the non-engineering minor specialization). The minor specialization framework of 20 credits has to be offered within the framework of the current Scheme of Studies of the primary / major discipline.**
 - 18. The institution shall offer atleast two elective groups out of the emerging area / open area for students of each major discipline. The emerging area / open electives can also be offered as standalone papers not forming a part of any elective groups also. The institute shall decide the group(s) and/or individual papers to be offered as electives based on the availability of infrastructure and faculty. From the groups / papers offered by the institute, an elective paper / group shall be taught if and only if the number of students in a paper is at-least 20 or at-least 1/3 of the students of a major / primary discipline for which the paper / group is to be offered. The APC of the department / institute may define a maximum number of students allowed to register for a paper as an elective (EAE / OAE).
 - 19. The institution shall offer atleast two elective papers from each program core elective group for students of each major / primary discipline. The institute shall decide the individual papers to be offered as electives (PCE) based on the availability of infrastructure and faculty. From the papers offered by the institute, an elective paper shall be taught if and only if the number of students in a paper is at-least 20 or at-least 1/3 of the students of a major / primary discipline for which the paper is to be offered. The APC of the department / institute may define a maximum number of students allowed to register for a paper as an elective (PCE).
 - 20. Teachers of the other department(s), as and when deputed by their department, for teaching the students enrolled in programmes offered by the department offering the programme shall be a part of the Academic Programme Committee of the discipline. Such teachers, for all academic matters, including teaching, teachers' continuous evaluation, term end examinations etc. shall be governed by the decisions of the APC of department offering the programme of study. Similarly, the guest faculty, the visiting faculty and the

Contract / Ad Hoc faculty as and when deputed to teach students of a particular department shall form a part of APC of the department.

21. The Paper IDs will be generated / issued / assigned by the Examination Division of the University.

22. The medium of instructions shall be English.

Emerging Area Elective Groups (for Minor Specialization) – Applicable only for Core Disciplines (EAE)

The minor specialization is offered through a set of five papers that the student has to study to acquire the minor specialization. The number of papers to be studied is two in 6th semester and three in 7th semester. The minor specialization shall be awarded if and only if 20 credits are earned from an individual / specific minor specialization area. From each paper group associated with a paper slot in a particular semester, the student shall be allowed to study only one paper group. The papers shall be allowed to be taken / studied by the students, by the APC of the department / institute, keeping in view that two papers studied by the student should not have a substantial overlap. All papers studied by the student should be substantially distinct in content.

Minor specialization is not necessary for award of the degree, the student may choose five papers from the groups offered by the institution to a particular student (belonging to a major discipline) across groups. Minimum two minor specialization groups should be offered by the institution to students of any particular major discipline from either of the open area or emerging area groups

An elective shall be offered to the student for each Minor Specialization group in Emerging Area (That is for EAE-1, EAE-2, etc.) based on the availability of resources and faculty at the institution and at least one third of the batch or at least 20 students must be willing to take the elective.

Each EAE slot is of 4 credits, if in a particular slot, the paper has no practical component, then it is of 4 credits (a pure theory paper), otherwise for purpose of examination and conduct of classes, the course is split in two papers, namely a theory paper of 3 credits and a practical paper of 1 credit. The student has to study for 4 credits per slot of EAE group. This is reflected by suffixing the paper code by T (for Theory component) and P (for Practical component), if required. The nomenclature of the paper group is <ACRONYM OF EMERGING AREA> - EAE - <SLOT NUMBER>< A or B or C etc., if required>. The major disciplines to which the Emerging Area Elective Group papers can be offered is specified as acronym together with the name of the minor specialization.

In lieu of Emerging Area Elective, students can study papers from Open Area Elective groups also as offered to them.

Emerging Area Specialization: Artificial Intelligence (for CSE / IT / CST / ITE / ECE / EE / EEE / ICE / ME / CE)

Semester	Paper Group	Paper Code	Paper Name	L	P	Credits
6	AI-EAE-1	AI-302T	Artificial Intelligence	3		3
		AI-302P	Artificial Intelligence Lab		2	1
6	AI-EAE-2	DA-304T	Statistics, Statistical Modelling & Data Analytics	3		3
		DA-304P	Statistics, Statistical Modelling & Data Analytics Lab		2	1
7	AI-EAE-3	SC-401T	Soft Computing	3		3
		SC-401P	Soft Computing Lab		2	1
7	AI-EAE-4	AI-403T	Artificial Intelligence Applications	3		3
		AI-403P	Artificial Intelligence Applications Lab		2	1
7	AI-EAE-5	AI-405T	Intelligent and Expert Systems	3		3
		AI-405P	Intelligent and Expert Systems Lab		2	1

Emerging Area Specialization: Artificial Intelligence and Machine Learning (for CSE / IT / CST / ITE / ECE / EE / EEE / ICE / ME / CE)

Semester	Paper Group	Paper Code	Paper Name	L	P	Credits
6	AIML-EAE-1	AI-302T	Artificial Intelligence	3		3
		AI-302P	Artificial Intelligence Lab		2	1
6	AIML-EAE-2	DA-304T	Statistics, Statistical Modelling & Data Analytics	3		3
		DA-304P	Statistics, Statistical Modelling & Data Analytics Lab		2	1
7	AIML-EAE-3	ML-407T	Machine Learning	3		3
		ML-407P	Machine Learning Lab		2	1
7	AIML-EAE-4	ML-409T	Reinforcement Learning and Deep Learning	3		3
		ML-409P	Reinforcement Learning and Deep Learning Lab		2	1
7	AIML-EAE-5	ML-411T	Pattern Recognition and Computer Vision	3		3
		ML-411P	Pattern Recognition and Computer Vision Lab		2	1

Emerging Area Specialization: Data Science (for CSE / IT / CST / ITE / ECE / EE / EEE / ICE / ME / CE)

Semester	Paper Group	Paper Code	Paper Name	L	P	Credits
6	DS-EAE-1	DA-304T	Statistics, Statistical Modelling & Data Analytics	3		3
		DA-304P	Statistics, Statistical Modelling & Data Analytics Lab		2	1
6	DS-EAE-2	AI-316T	Artificial Intelligence and Machine Learning	3		3
		AI-316P	Artificial Intelligence and Machine Learning Lab		2	1
7	DS-EAE-3	DS-427T	Data Science using R	3		3
		DS-427P	Data Science using R Lab		2	1
7	DS-EAE-4	DS-429T	Big Data Analytics	3		3
		DS-429P	Big Data Analytics Lab		2	1
7	DS-EAE-5A OR	DS-431T	Business Intelligence	3		3
		DS-431P	Business Intelligence Lab		2	1
	DS-EAE-5B	DS-433T	Exploratory Data Analytics and Data Visualization	3		3
		DS-433P	Exploratory Data Analytics and Data Visualization Lab		2	1

Emerging Area Specialization: Block Chain Technology (for CSE / IT / CST / ITE/ECE/EE/EEE)

Semester	Paper Group	Paper Code	Paper Name	L	P	Credits
6	BT-EAE-1	CS-306T	Mathematics of Modern Cryptography	3		3
		CS-306P	Mathematics of Modern Cryptography Lab		2	1
6	BT-EAE-2	BT-308T	Blockchain Technology	3		3
		BT-308P	Blockchain Technology Lab		2	1
7	BT-EAE-3	BT-413T	Bitcoin and Cryptocurrency Technologies	3		3
		BT-413P	Bitcoin and Cryptocurrency Technologies Lab		2	1
7	BT-EAE-4	BT-415T	Smart Contracts	3		3
		BT-415P	Smart Contracts Lab		2	1
7	BT-EAE-5A OR	BT-417T	Blockchain for Cyber Security	3		3
		BT-417P	Blockchain for Cyber Security Lab		2	1
	BT-EAE-5B	BT-419T	Blockchain Technology in Web Development	3		3
		BT-419P	Blockchain Technology in Web Development Lab		2	1

Emerging Area Specialization: Internet of Things (for CSE / IT / CST / ITE / ECE / EE / EEE / ICE / ME)

Semester	Paper Group	Paper Code	Paper Name	L	P	Credits
6	IOT-EAE-1A OR	IOT-324T	Introduction to Internet of Things	3		3
		IOT-324P	Introduction to Internet of Things Lab		2	1
	IOT-EAE-1B	IOT-326T	Introduction to Sensors and Transducers	3		3
		IOT-326P	Introduction to Sensors and Transducers Lab		2	1
6	IOT-EAE-2A OR	ES-328T	Embedded Linux	3		3
		ES-328P	Embedded Linux Lab		2	1
	IOT-EAE-2B OR	IOT-330T	Programming in Python	3		3
		IOT-330P	Programming in Python Lab		2	1
	IOT-EAE-2C	IOT-332T	Wireless Sensor Networks	3		3
		IOT-332P	Wireless Sensor Networks Lab		2	1
7	IOT-EAE-3	IOT-441T	IoT with Arduino, ESP and Raspberry Pi	3		3
		IOT-441P	IoT with Arduino, ESP and Raspberry Pi Lab		2	1
7	IOT-EAE-4	IOT-443T	Design of Smart Systems	3		3
		IOT-443P	Design of Smart Systems Lab		2	1
7	IOT-EAE-5A OR	IOT-445T	Internet of Things Industrial and Medical Case Studies	3		3
		IOT-445P	Internet of Things Industrial and Medical Case Studies Lab		2	1
	IOT-EAE-5B OR	IOT-447T	Internet of Things Frameworks	3		3
		IOT-447P	Internet of Things Frameworks Lab		2	1
	IOT-EAE-5C	IOT-449	Privacy and Security issues in IoT	4		4

Emerging Area Specialization: Internet of Things and Cyber Security including Block Chain Technology (for CSE / IT / CST / ITE / ECE / EE / EEE / ICE / ME)

Semester	Paper Group	Paper Code	Paper Name	L	P	Credits
6	ICB-EAE-1A OR	IOT-324T	Introduction to Internet of Things	3		3
		IOT-324P	Introduction to Internet of Things Lab		2	1
	ICB-EAE-1B	IOT-326T	Introduction to Sensors and Transducers	3		3
		IOT-326P	Introduction to Sensors and Transducers Lab		2	1
6	ICB-EAE-2A OR	ES-328T	Embedded Linux	3		3
		ES-328P	Embedded Linux Lab		2	1
	ICB-EAE-2B OR	IOT-330T	Programming in Python	3		3
		IOT-330P	Programming in Python Lab		2	1
	ICB-EAE-2C	IOT-332T	Wireless Sensor Networks	3		3
		IOT-332P	Wireless Sensor Networks Lab		2	1
7	ICB-EAE-3	CS-423T	Cyber Security and Forensics	3		3
		CS-423P	Cyber Security and Forensics Lab		2	1
7	ICB-EAE-4	IOT-441T	IoT with Arduino, ESP and Raspberry Pi	3		3
		IOT-441P	IoT with Arduino, ESP and Raspberry Pi Lab		2	1
7	ICB-EAE-5	BT-443T	Blockchain Technology	3		3
		BT-443P	Blockchain Technology Lab		2	1

Emerging Area Specialization: Networks (for CSE / IT / CST / ITE / ECE)

Semester	Paper Group	Paper Code	Paper Name	L	P	Credits
6	NET-EAE-1	NET-344T	Advanced Computer Networks and Administration	3		3
		NET-344P	Advanced Computer Networks and Administration Lab		2	1
6	NET-EAE-2	NET-346T	Linux System Administration	3		3
		NET-346P	Linux System Administration Lab		2	1
7	NET-EAE-3	NET-471T	Network Programming	3		3
		NET-471P	Network Programming Lab		2	1
7	NET-EAE-4	NET-473T	Cloud Computing and Security	3		3
		NET-473P	Cloud Computing and Security Lab		2	1
7	NET-EAE-5	NET-475T	Wireless Sensor Networks	3		3
		NET-475P	Wireless Sensor Networks Lab		2	1

Emerging Area Specialization: Cyber Security (for CSE / IT / CST / ITE / ECE)

Semester	Paper Group	Paper Code	Paper Name	L	P	Credits
6	CS-EAE-1	CS-310T	Information Theory and Coding	3		3
		CS-310P	Information Theory and Coding Lab		2	1
6	CS-EAE-2A OR	CS-312T	Network Security and Cryptography	3		3
		CS-312P	Network Security and Cryptography Lab		2	1
	CS-EAE-2B	CS-314T	Network Security Issues and Challenges	3		3
		CS-314P	Network Security Issues and Challenges Lab		2	1
7	CS-EAE-3	CS-421T	Cyber Crime and Cyber Laws	3		3
		CS-421P	Cyber Crime and Cyber Laws Lab		2	1
7	CS-EAE-4	CS-423T	Cyber Security and Forensics	3		3
		CS-423P	Cyber Security and Forensics Lab		2	1
7	CS-EAE-5	CS-425T	Ethical Hacking	3		3
		CS-425P	Ethical Hacking Lab		2	1

Emerging Area Specialization: Soft Computing (for CSE / IT / CST / ITE / ECE / EE / EEE / ICE / ME / CE)

Semester	Paper Group	Paper Code	Paper Name	L	P	Credits
6	SC-EAE-1	DA-304T	Statistics, Statistical Modelling & Data Analytics	3		3
		DA-304P	Statistics, Statistical Modelling & Data Analytics Lab		2	1
6	SC-EAE-2	ML-348T	Artificial Neural Networks and Deep Learning	3		3
		ML-348P	Artificial Neural Networks and Deep Learning Lab		2	1
7	SC-EAE-3	SC-477T	Fuzzy Systems and Applications	3		3
		SC-477P	Fuzzy Systems and Applications Lab		2	1
7	SC-EAE-4	SC-479T	Global Optimization Methods	3		3
		SC-479P	Global Optimization Methods Lab		2	1
7	SC-EAE-5	SC-481T	Soft Computing and Expert Systems	3		3
		SC-481P	Soft Computing and Expert Systems Lab		2	1

Emerging Area Specialization: Machine Learning & Data Analytics (for CSE / IT / CST / ITE / ECE / EE / EEE / ICE / ME / CE)

Semester	Paper Group	Paper Code	Paper Name	L	P	Credits
6	MLDA-EAE-1	DA-304T	Statistics, Statistical Modelling & Data Analytics	3		3
		DA-304P	Statistics, Statistical Modelling & Data Analytics Lab		2	1
6	MLDA-EAE-2A OR	DA-338T	Data Analytics	3		3
		DA-338P	Data Analytics Lab		2	1
	MLDA-EAE-2B OR	DS-340T	Data Visualization	3		3
		DS-340P	Data Visualization Lab		2	1
	MLDA-EAE-2C	ML-342T	Machine Learning	3		3
		ML-342P	Machine Learning Lab		2	1
7	MLDA-EAE-3	ML-463T	Supervised and Deep Learning	3		3
		ML-463P	Supervised and Deep Learning Lab		2	1
7	MLDA-EAE-4	ML-465T	Unsupervised Learning	3		3
		ML-465P	Unsupervised Learning Lab		2	1
7	MLDA-EAE-5A OR	ML-467T	Machine Learning and Data Analytics Case Studies	3		3
		ML-467P	Machine Learning and Data Analytics Case Studies Lab		2	1
	MLDA-EAE-5B	ML-469T	Machine Learning and Data Analytics Frameworks	3		3
		ML-469P	Machine Learning and Data Analytics Frameworks Lab		2	1

Emerging Area Specialization: Software Engineering (for CSE / IT / CST / ITE)

Semester	Paper Group	Paper Code	Paper Name	L	P	Credits
6	SE-EAE-1	SE-350T	Software Measurements, Metrics and Modelling	3		3
		SE-350P	Software Measurements, Metrics and Modelling Lab		2	1
6	SE-EAE-2A OR	SE-352T	Service Oriented Architecture	3		3
		SE-352P	Service Oriented Architecture Lab		2	1
	SE-EAE-2B	SE-354T	Software Project Management	3		3
		SE-354P	Software Project Management Lab		2	1
7	SE-EAE-3	SE-483T	Mining Software Repositories and Predictive Modelling	3		3
		SE-483P	Mining Software Repositories and Predictive Modelling Lab		2	1
7	SE-EAE-4A OR	SE-485	Software Security	4		4
		SE-487T	Software Verification, Validation and Testing	3		3
	SE-EAE-4B	SE-487P	Software Verification, Validation and Testing Lab		2	1
7	SE-EAE-5	SE-489	Software Engineering Standards	4		4

Emerging Area Specialization: Full Stack Development (for CSE / IT / CST / ITE)

Semester	Paper Group	Paper Code	Paper Name	L	P	Credits
6	FSD-EAE-1	FSD-318T	Advanced Java Programming	3		3
		FSD-318P	Advanced Java Programming Lab		2	1
6	FSD-EAE-2A OR	FSD-320T	Web Development using MEAN Stack	3		3
		FSD-320P	Web Development using MEAN Stack Lab		2	1
	FSD-EAE-2B	FSD-322T	Web Development using MERN Stack	3		3
		FSD-322P	Web Development using MERN Stack Lab		2	1
7	FSD-EAE-3	FSD-435T	PHP Programming and MySQL	3		3
		FSD-435P	PHP Programming and MySQL Lab		2	1
7	FSD-EAE-4	FSD-437T	Mobile App Development	3		3
		FSD-437P	Mobile App Development Lab		2	1
7	FSD-EAE-5	FSD-439T	Web and Mobile Application Testing and Deployment	3		3
		FSD-43P	Web and Mobile Application Testing and Deployment Lab		2	1

Emerging Area Specialization: Image Processing and Computer Vision (for CSE/IT/CST/ITE/ECE/ EE / EEE / ICE)

Semester	Paper Group	Paper Code	Paper Name	L	P	Credits
6	IPCV-EAE-1A OR	IPCV-334T	Digital Image Processing	3		3
		IPCV-334P	Digital Image Processing Lab		2	1
	IPCV-EAE-1B	IPCV-356T	Digital Signal and Image Processing	3		3
		IPCV-356P	Digital Signal and Image Processing Lab		2	1
6	IPCV-EAE-2	IPCV-336T	Pattern Recognition	3		3
		IPCV-336P	Pattern Recognition Lab		2	1
7	IPCV-EAE-3	IPCV-451T	Computer Vision	3		3
		IPCV-451P	Computer Vision Lab		2	1
7	IPCV-EAE-4A OR	IPCV-453T	Biometrics	3		3
		IPCV-453P	Biometrics Lab		2	1
	IPCV-EAE-4B OR	IPCV-455T	Medical Image Processing, Analysis and Reconstruction	3		3
		IPCV-455P	Medical Image Processing, Analysis and Reconstruction Lab		2	1
	IPCV-EAE-4C	IPCV-457T	Remote Sensing Image Analysis and Classification	3		3
		IPCV-457P	Remote Sensing Image Analysis and Classification Lab		2	1
7	IPCV-EAE-5A OR	IPCV-459T	Deep Learning for Image Processing and Computer Vision	3		3
		IPCV-459P	Deep Learning for Image Processing and Computer Vision Lab		2	1
	IPCV-EAE-5B	IPCV-461T	Machine Learning for Image and Vision Analysis	3		3
		IPCV-461P	Machine Learning for Image and Vision Analysis Lab		2	1

Emerging Area Specialization: Robotics and Automation (for ECE / ICE / ME)

Semester	Paper Group	Paper Code	Paper Name	L	P	Credits
6	RA-EAE-1	RA-324T	Robot Kinematics and Dynamics	3		3
		RA-324P	Robot Kinematics and Dynamics Lab		2	1
6	RA-EAE-2	IOT-326T	Introduction to Sensors and Transducers	3		3
		IOT-326P	Introduction to Sensors and Transducers Lab		2	1
7	RA-EAE-3	RA-437T	Robot Actuation Systems	3		3
		RA-437P	Robot Actuation Systems Lab		2	1
7	RA-EAE-4	RA-439T	Control Hardware and Interfacing	3		3
		RA-439P	Control Hardware and Interfacing Lab		2	1
7	RA-EAE-5	RA-441T	AI in Robotics	3		3
		RA-441P	AI in Robotics Lab		2	1

Emerging Area Specialization: Embedded Systems (for CSE/IT/CST/ITE/ECE/EE/EEE /ICE)

Semester	Paper Group	Paper Code	Paper Name	L	P	Credits
6	ES-EAE-1A OR	ES-302T	Microprocessors and Interfacing	3		3
		ES-302P	Microprocessors and Interfacing Lab		2	1
	ES-EAE-1B OR	ES-308T	Introduction to Data Communication and Networking	3		3
		ES-308P	Introduction to Data Communication and Networking Lab		2	1
	ES-EAE-1C	ES-310T	Advanced Microprocessors (ARM) & Interfacing	3		3
		ES-310P	Advanced Microprocessors (ARM) & Interfacing Lab		2	1
6	ES-EAE-2A OR	ES-304	Real Time Operating Systems	4		4
		ES-306T	Embedded System Architecture and Design	3		3
	ES-EAE-2B	ES-306P	Embedded System Architecture and Design Lab		2	1
7	ES-EAE-3A OR	ES-401T	Programming in C for Embedded Systems	3		3
		ES-401P	Programming in C for Embedded Systems Lab		2	1
	ES-EAE-3B	ES-403T	VHDL Programming	3		3
		ES-403P	VHDL Programming Lab		2	1
7	ES-EAE-4	ES-405T	Real Time Embedded System Programming	3		3
		ES-405P	Real Time Embedded System Programming Lab		2	1
7	ES-EAE-5A OR	ES-407T	Embedded Linux	3		3
		ES-407P	Embedded Linux Lab		2	1
	ES-EAE-5B OR	IOT-409T	Introduction to Sensors and Transducers	3		3
		IOT-409P	Introduction to Sensors and Transducers Lab		2	1
	ES-EAE-5C	ES-411T	Logic Design and Analysis using Verilog	3		3
		ES-411P	Logic Design and Analysis using Verilog Lab		2	1

Emerging Area Specialization: VLSI Design (for ECE/ EE /EEE)

Semester	Paper Group	Paper Code	Paper Name	L	P	Credits
6	VLSI-EAE-1	VLSI-328T	Semiconductor Devices and Modelling	3		3
		VLSI-328P	Semiconductor Devices and Modelling Lab		2	1
6	VLSI-EAE-2	VLSI-330T	VLSI	3		3
		VLSI-330P	VLSI Lab		2	1
7	VLSI-EAE-3	VLSI-443T	CMOS Analog Integrated Circuit Design	3		3
		VLSI-443P	CMOS Analog Integrated Circuit Design Lab		2	1
7	VLSI-EAE-4	VLSI-445T	CMOS Digital Circuits Design	3		3
		VLSI-445P	CMOS Digital Circuits Design Lab		2	1
7	VLSI-EAE-5A OR	VLSI-447	CMOS Mixed Signal Circuit Design	4		4
	VLSI-EAE-5B OR	VLSI-449T	Low Power VLSI Design	3		3
		VLSI-449P	Low Power VLSI Design Lab		2	1
	VLSI-EAE-5C	VLSI-451	VLSI Testing	4		4

Emerging Area Specialization: Wireless and Mobile Communications (for ECE/ EE /EEE)

Semester	Paper Group	Paper Code	Paper Name	L	P	Credits
6	WMC-EAE-1A OR	WMC-332T	Optical Networks	3		3
		WMC-332P	Optical Networks Lab		2	1
	WMC-EAE-1B OR	WMC-334T	Random Processes and Stochastic Systems	3		3
		WMC-334P	Random Processes and Stochastic Systems Lab		2	1
	WMC-EAE-1C	WMC-336T	Wireless Communication and Networks	3		3
		WMC-336P	Wireless Communication and Networks Lab		2	1
6	WMC-EAE-2	WMC-338T	Cellular and Mobile Communication	3		3
		WMC-338P	Cellular and Mobile Communication Lab		2	1
7	WMC-EAE-3A OR	WMC-453T	Ad hoc and Sensor Networks	3		3
		WMC-453P	Ad hoc and Sensor Networks Lab		2	1
	WMC-EAE-3B	WMC-455T	Mobile Computing	3		3
		WMC-455P	Mobile Computing Lab		2	1
7	WMC-EAE-4	WMC-457	Cognitive Radio & Networks	4		4
7	WMC-EAE-5	WMC-459	Privacy and Security in Wireless Networks	4		4

Emerging Area Specialization: Electrical Vehicles (for EE / EEE / ICE / ME)

Semester	Paper Group	Paper Code	Paper Name	L	P	Credits
6	EV-EAE-1	EV-308T	Electric Vehicle Powertrain and Motor Design	3		3
		EV-308P	Electric Vehicle Powertrain and Motor Design Lab		2	1
6	EV-EAE-2	EV-310T	Battery Management Systems	3		3
		EV-310P	Battery Management Systems Lab		2	1
7	EV-EAE-3	EV-413T	EV Charging Infrastructure Technology	3		3
		EV-413P	EV Charging Infrastructure Technology Lab		2	1
7	EV-EAE-4	EV-415	Economics and Policies of e-Mobility	4		4
7	EV-EAE-5	EV-417T	Embedded Systems for Electric Vehicles	3		3
		EV-417P	Embedded Systems for Electric Vehicles Lab		2	1