Vidyalankar Institute of Technology

An Autonomous Institute affiliated to University of Mumbai

Bachelor of Technology

in

Electronics and Computer Science

Programme Structure (R-2022)

(As per AICTE guidelines, with effect from the Academic Year 2022-23)

Preamble

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated, and taken forward in a systematic manner. Therefore, autonomy for Vidyalankar Institute of Technology is not merely a transition from pre-cooked syllabi to self-designed curriculum. The autonomous curriculum of the Institute offers required academic flexibility with emphasis on industry requirements and market trends, employability and problem-solving approach which leads to improving competency level of learners with diverse strengths. In line with this, the curriculum framework designed is **Choice Based Credit and Grading System (CBCGS)**. The number of credits for each category of courses learnt by learners, internships and projects is finalized considering the scope of study and the ability that a learner should gain through the programme. The overall credits and approach of curriculum proposed is in line with AICTE model curriculum.

The curriculum comprises courses from various categories like basic sciences, humanities and social sciences, engineering sciences, general education and branch specific courses including professional electives and open electives. The curriculum has core courses of branch of engineering positioned and sequenced to achieve sequential and integral learning of the entire breadth of the specific branch. These courses are completed by the third year of the engineering programme that enables learners to prepare for higher education during their final year. Professional elective courses, that begin from third year of programme, offer flexibility and diversity to learners to choose specialization from a basket of recent developments in their field of technology. The selection of unique professional elective courses based on industrial requirements and organizing them into tracks is a salient feature of this curricula ensuring employability. Open Elective courses cover multi-disciplinary, special skill development, project management and similar knowledge that make learners capable of working in an industrial environment.

For holistic development of learners, apart from technical courses, Humanities and Social Science courses develop the required soft-skills and attitude amongst learners. Our curriculum also introduces Social Service Internship and Internship with institutes abroad along with courses like Design Thinking, Wellness – Body, Mind & Spirit, Indian Traditional Knowledge system under General Education category. These general education courses aim to create balance in brain hemispheres and hence improve learners' clarity in thoughts and responses.

Additionally, curriculum provides add-on Honours/Minor degree that involves field/ domain study. Learners can avail themselves of this degree by completing the requirement of additional 18 credits.

Thus, the academic plan of VIT envisages a shift from summative to formative and competency-based learning system which will enhance learner's ability towards higher education, employability and entrepreneurship.

Chairman, Board of Studies   Chairman, Academic Council
Department of Electronics and Computer Science   Vidyalankar Institute of Technology
Vidyalankar Institute of Technology

COMPETENCE BASED COURSE CATEGORIES AND CREDIT ALLOTMENT

Sr. No.	Competence	Course Category	Credits / Audit
I	Knowledge	Basic Science	21
II		Engineering Science	15
III		Core	51
IV	Skill	Professional Elective	18
V		Open Elective	15
VI		Project and Internship	16
VII	Attitude	Humanities, Social Sciences and Management	12
VIII		General Education	14
Total			**162**

Learner is expected to complete requirement of 162 credits (with minimum credits under each category as mentioned above) for B.Tech. degree in Electronics and Computer Science.

Additionally, learners can choose to avail Honours/Minor Degree by completing requirements of 18 credits, which will be over and above the 162 credits required for B.Tech. degree.

Structure of Honours/ Minor Degree

Sr. No.	Category	Credits
1	Course Work	9
2	Industrial Interaction	1
3	Survey Report / Paper	2
4	Seminar	2
5	Capstone Project	4
Total		**18**

For details of add-on Honours/Minor Degree refer to Honours/Minor Degree document of B.Tech. Electronics and Computer Science Programme applicable for R-2022 curriculum.

Definition of Credit

Duration	Credit
1 Hr. Lecture (L) per week	1
1 Hr. Tutorial (T) per week	1
1 Hr. Practical (P) per week	0.5

Courses Under Various Categories

I.   Basic Science Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	BS15T*	Engineering Physics	2	-	-	2	1
2	BS15P*	Engineering Physics Lab	-	2	-	1	1
3	BS02*	Engineering Mathematics-I	3	-	-	3	1
4	BS16T*	Engineering Chemistry	2	-	-	2	2
5	BS16P*	Engineering Chemistry Lab	-	2	-	1	2
6	BS04*	Engineering Mathematics-II	3	-	-	3	2
7	BS06	Engineering Mathematics-III	3	-	-	3	3
8	BS08	Engineering Mathematics-IV	3	-	-	3	4
9	BS12	Engineering Mathematics-V	2	-	1	3	5

* Courses exempted for Direct Second Year (DSY) students who will secure admission through lateral entry from the A.Y. 2023-24.

II.   Engineering Science Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	ES01T*	Engineering Graphics	2	-	-	2	1
2	ES01P*	Engineering Graphics Lab	-	2	-	1	1
3	ES02T*	Engineering Mechanics	2	-	-	2	1
4	ES02P*	Engineering Mechanics Lab	-	2	-	1	1
5	ES03T*	Digital Electronics	2	-	-	2	1
6	ES03P*	Digital Electronics Lab	-	2	-	1	1
7	ES04T*	Structured Programming	2	-	-	2	2
8	ES04P*	Structured Programming Lab	-	2	-	1	2
9	ES05T*	Object Oriented Programming	2	-	-	2	2
10	ES05P*	Object Oriented Programming Lab	-	2	-	1	2

* Courses exempted for Direct Second Year (DSY) students who will secure admission through lateral entry from the A.Y. 2023-24.

III. Core Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	EC01T	Electronic Devices and Circuits	2	-	-	2	3
2	EC01P	Electronic Devices and Circuits Lab	-	2	-	1	3
3	EC02T	Electrical Circuit Analysis	2	-	-	2	3
4	EC02P	Electrical Circuit Analysis Lab	-	2	-	1	3
5	EC03T	Data Structures and Algorithms	2	-	-	2	3
6	EC03P	Data Structures and Algorithms Lab	-	2	-	1	3
7	EC04T	Computer Organization and Architecture	2	-	-	2	4
8	EC04P	Computer Organization and Architecture Lab	-	2	-	1	4
9	EC05T	Control Systems Engineering	2	-	-	2	4
10	EC05P	Control Systems Engineering Lab	-	2	-	1	4
11	EC06T	Signals and Systems	2	-	-	2	4
12	EC06P	Signals and Systems Lab	-	2	-	1	4
13	EC07T	Web Technology	2		-	2	4
14	EC07P	Web Technology Lab	-	2	-	1	4
15	EC08T	Database Management System	2	-	-	2	4
16	EC08P	Database Management System Lab	-	2	-	1	4
17	EC09T	Python Programming	2	-	-	2	4
18	EC09P	Python Programming Lab	-	2	-	1	4
19	EC10T	Basic VLSI Design	2	-	-	2	5
20	EC10P	Basic VLSI Design Lab	-	2	-	1	5
21	EC11T	Microcontroller and Applications	2	-	-	2	5
22	EC11P	Microcontroller and Applications Lab	-	2	-	1	5
23	EC12T	Operating System	2	-	-	2	5
24	EC12P	Operating System Lab	-	2	-	1	5
25	EC13T	Analysis of Algorithms	2	-	-	2	5

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
26	EC13P	Analysis of Algorithms Lab	-	2	-	1	5
27	EC14T	Digital Image Processing	2	-	-	2	6
28	EC14P	Digital Image Processing Lab	-	2	-	1	6
29	EC15T	Theory of Computer Science	2	-	1	3	6
30	EC16T	Computer Networks	2	-	-	2	6
31	EC16P	Computer Networks Lab	-	2	-	1	6
32	EC17T	Analog & Digital Communications	2	-	-	2	6
33	EC17P	Analog & Digital Communications Lab	-	2	-	1	6

IV.   Professional Elective Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	EC21T	Artificial Intelligence	2	-	-	2	5
2	EC21P	Artificial Intelligence lab	-	2	-	1	5
3	EC22T	Advanced Database Management System	2	-	-	2	5
4	EC22P	Advanced Database Management System Lab	-	2	-	1	5
5	EC23T	Modern Sensors for IOT	2	-	-	2	5
6	EC23P	Modern Sensors for IOT Lab	-	2	-	1	5
7	EC24T	Digital System Design	2	-	-	2	5
8	EC24P	Digital System Design Lab	-	2	-	1	5
9	EC25T	Soft Computing	2	-	-	2	6
10	EC25P	Soft Computing Lab	-	2	-	1	6
11	EC26T	Data Warehousing and Mining	2	-	-	2	6
12	EC26P	Data Warehousing and Mining Lab	-	2	-	1	6
13	EC27T	Principles of IOT	2	-	-	2	6
14	EC27P	Principles of IOT Lab	-	2	-	1	6

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
15	EC28T	Advanced VLSI Design and Technology	2	-	-	2	6
16	EC28P	Advanced VLSI Design and Technology Lab	-	2	-	1	6
17	EC29T	Machine Learning	2	-	-	2	6
18	EC29P	Machine Learning Lab	-	2	-	1	6
19	EC30T	Probabilistic Graphical Models	2	-	-	2	6
20	EC30P	Probabilistic Graphical Models Lab	-	2	-	1	6
21	EC31T	Embedded System Design with tiny OS	2	-	-	2	6
22	EC31P	Embedded System Design with tiny OS Lab	-	2	-	1	6
23	EC32T	Analog IC Design	2	-	-	2	6
24	EC32P	Analog IC Design Lab	-	2	-	1	6
25	EC33T	Data Analytics & Visualization	2	-	-	2	7
26	EC33P	Data Analytics & Visualization Lab	-	2	-	1	7
27	EC34T	Big Data Analytics	2	-	-	2	7
28	EC34P	Big Data Analytics Lab	-	2	-	1	7
29	EC35T	IoT and Edge Computing	2	-	-	2	7
30	EC35P	IoT and Edge Computing	-	2	-	1	7
31	EC36T	ASIC and Verification	2	-	-	2	7
32	EC36P	ASIC and Verification Lab	-	2	-	1	7
33	EC37T	Deep Learning	2	-	-	2	7
34	EC37P	Deep Learning Lab	-	2	-	1	7
35	EC38T	Recommendation Systems	2	-	-	2	7
36	EC38P	Recommendation Systems Lab	-	2	-	1	7
37	EC39T	IoT Security and Trust	2	-	-	2	7
38	EC39P	IoT Security and Trust Lab	-	2	-	1	7
39	EC40T	System on Chip	2	-	-	2	7
40	EC40P	System on Chip Lab	-	2	-	1	7
41	EC41T	Natural language processing	2	-	-	2	7

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
42	EC41P	Natural language processing Lab	-	2	-	1	7
43	EC42T	Text, Web & Social Media Analytics	2	-	-	2	7
44	EC42P	Text, Web & Social Media Analytics Lab	-	2	-	1	7
45	EC43T	Industrial IOT	2	-	-	2	7
46	EC43P	Industrial IOT Lab	-	2	-	1	7
47	EC44T	Mixed Signal VLSI	2	-	-	2	7
48	EC44P	Mixed Signal VLSI Lab	-	2	-	1	7

V. Open Elective Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	OE21	Cyber Law	3	-	-	3	7/8
2	OE22	Project Management	3	-	-	3	7/8
3	OE23	Product Lifecycle Management	3	-	-	3	7/8
4	OE24	Sustainability Management	3	-	-	3	7/8
5	OE25	Operation Research	3	-	-	3	7/8
6	OE26	IPR and Patenting	3	-	-	3	7/8
7	OE27	Research Methodology	3	-	-	3	7/8
8	OE28	Renewable Energy Management	3	-	-	3	7/8
9	OE29	Energy Audit and Management	3	-	-	3	7/8
10	OE30	Bioinformatics	3	-	-	3	7/8
11	OE31	Nanotechnology	3	-	-	3	7/8

VI. Project and Internship

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	EC45	Mini Project	-	4	-	2	5
2	EC46	Industry Internship	-	150 (Total)	-	5	Break after Sem 6
3	EC47	Project-1 (Synopsis)	3	-	-	3	7
4	EC48	Project-2 (Final)	1	10	-	6	8

VII. Humanities, Social Sciences and Management Courses

Sr. No.	Course Code	Course Name	Theory	Practical	Tutorial	Credits	Preferred Semester
1	HS01T*	Effective Communication	2	-	-	2	1
2	HS01P*	Effective Communication Lab	-	2	-	1	1
3	HS02T*	Professional Skills	2	-	-	2	2
4	HS02P*	Professional Skills Lab	-	2	-	1	2
5	HS03	Technical and Business Writing	1	2	-	2	3
6	HS06	Principles of Economics and Management	2	-	1	3	4
7	HS04	Presentation Skills	-	2	-	1	5

* Courses exempted for Direct Second Year (DSY) students who will secure admission through lateral entry from the A.Y. 2023-24.

VIII. General Education

GE Sub-Category	GE Sub-Category Code
Arts	A
Social and Behavioral Science	SB
Creativity and Innovation	CI
Political Science	PS
Physical Education and Wellness	PEW
Finance	F
Natural Science	NS
Wonders of Infrastructure	WI

Course Code	Course Name	Credits
GEA01	Voice Culture for Professional Speaking	2
GEA02	Various Dance Forms	2
GEA03	Exploring Indian Art	2
GESB01#	Social Service Internship/ Project	3
GESB02	Universal Human Values	2
GESB03	Indian Traditional Knowledge System	2
GESB04	Corporate and Social Etiquettes	2
GESB05	Global Citizenship Education	2
GESB06	Responsibility towards sustainable environment	2
GESB07	Psychology	2
GECI01T	Design Thinking	2
GECI01P	Design Thinking Lab	1

GECI02	Innovation and Entrepreneurship	2
GEPS01	Indian Constitution	2
GEPS02	Four Pillars of Democratic Nation	2
GEPEW01	Wellness – Body, Mind & Spirit	2
GEPEW02	IQ vs EQ	2
GEPEW03	Nutrition and Physical Wellness	2
GEF01	Basics of Finance & Legal aspects for Business	2
GEF02	Financial Management for beginners	2
GENS01	Facets of Astronomy	2
GENS02	Modern Farming	2
GEWI01	Railways - Wonders of Infrastructure	2
GE01$	Internship with other Institutes (Credit Transfer)	4

 # For GESB01- Social Service Internship/ Project: 2 hours / week slot will be provided during the semester (in regular timetable). Additional work of 60 hours needs to be completed during the semester (besides regular timetable) or after the semester (during inter-semester break).

$ For GE01- Internship with other Institutes (Credit Transfer): Internship with other reputed institutes equivalent to 4 credits is recommended to be done by learner during second year inter semester break (i.e. summer break between semester 4 and semester 5).

Note: 07 credits of the required 14 credits, under GE category, are exempted for Direct Second Year (DSY) students who will secure admission through lateral entry from the A.Y. 2023-24. Such students can opt for any courses from the above list to fulfil the required credits for the award of a degree.

Course Structure and Assessment Guidelines

for

Bachelor of Technology

in

Electronics and Computer Science

First Year B. Tech. Electronics and Computer Science   **Semester: I**
Course Structure and Assessment Guidelines

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
HS01T	Effective Communication	Theory	2	15	20	40	075
HS01P	Effective Communication Lab	Practical	1	25	-	25	050
BS02	Engineering Mathematics-I	Theory	3	20	30	50	100
BS15T	Engineering Physics	Theory	2	15	20	40	075
BS15P	Engineering Physics Lab	Practical	1	25	-	25	050
ES04T	Structured Programming	Theory	2	15	20	40	075
ES04P	Structured Programming Lab	Practical	1	25	-	25	050
ES03T	Digital Electronics	Theory	2	15	20	40	075
ES03P	Digital Electronics Lab	Practical	1	25	-	25	050
ES02T	Engineering Mechanics	Theory	2	15	20	40	075
ES02P	Engineering Mechanics Lab	Practical	1	25	-	25	050
GEXX*	Any GE course from below list	Theory	2	As Per Course			
Total			**20**				

ISA=In Semester Assessment, MSE=Mid Semester Examination, ESE=End Semester Examination

*Selection based on the subset of GE courses made available by the Institute for the semester.

The assessment guidelines for the courses of different credits are mentioned above. Notwithstanding the above, each course faculty shall have the choice to propose her/his assessment methodology based on the nature of the course. However, the proposed assessment methodology shall be approved by a panel constituted at Institute level and published to the learners before the commencement of the semester.

List of General Education Elective Courses (GEXX)

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40%
Code	Name			ISA	MSE	ESE	of total marks)
GEA01	Voice Culture for Professional Speaking	Theory	2	25	-	50	075
GEA02	Various Dance Forms	Theory	2	25	-	50	075
GEA03	Exploring Indian Art	Theory	2	25	-	50	075
GESB02	Universal Human Values	Theory	2	25	-	50	075
GESB03	Indian Traditional Knowledge System	Theory	2	25	-	50	075
GESB04	Corporate and Social Etiquettes	Theory	2	25	-	50	075
GESB05	Global Citizenship Education	Theory	2	25	-	50	075
GESB06	Responsibility towards sustainable environment	Theory	2	25	-	50	075
GESB07	Psychology	Theory	2	25	-	50	075
GECI02	Innovation and Entrepreneurship	Theory	2	25	-	50	075
GEPS01	Indian Constitution	Theory	2	25	-	50	075
GEPS02	Four Pillars of Democratic Nation	Theory	2	25	-	50	075
GEPEW01	Wellness – Body, Mind & Spirit	Theory	2	25	-	50	075
GEPEW02	IQ vs EQ	Theory	2	25	-	50	075
GEPEW03	Nutrition and Physical Wellness	Theory	2	25	-	50	075
GEF01	Basics of Finance & Legal aspects for Business	Theory	2	25	-	50	075
GEF02	Financial Management for beginners	Theory	2	25	-	50	075
GENS01	Facets of Astronomy	Theory	2	25	-	50	075
GENS02	Modern Farming	Theory	2	25	-	50	075
GEWI01	Railways - Wonders of Infrastructure	Theory	2	25	-	50	075

First Year B. Tech. Electronics and Computer Science   **Semester: II**
Course Structure and Assessment Guidelines

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
HS02T	Professional Skills	Theory	2	15	20	40	075
HS02P	Professional Skills Lab	Practical	1	25	-	25	050
BS04	Engineering Mathematics-II	Theory	3	20	30	50	100
BS16T	Engineering Chemistry	Theory	2	15	20	40	075
BS16P	Engineering Chemistry Lab	Practical	1	25	-	25	050
ES01T	Engineering Graphics	Theory	2	15	20	40	075
ES01P	Engineering Graphics Lab	Practical	1	25	-	25	050
ES05T	Object Oriented Programming	Theory	2	15	20	40	075
ES05P	Object Oriented Programming Lab	Practical	1	25	-	25	050
GECI01T	Design Thinking	Theory	2	15	20	40	075
GECI01P	Design Thinking Lab	Practical	1	-	-	50	050
GEXX*	Any One GE course from below list	Theory	2	As Per Course			
Total			**20**				

ISA=In Semester Assessment, MSE= Mid Semester Examination, ESA= End Semester Examination

*Selection based on the subset of GE courses made available by the Institute for the semester.

The assessment guidelines for the courses of different credits are mentioned above. Notwithstanding the above, each course faculty shall have the choice to propose her/his assessment methodology based on the nature of the course. However, the proposed assessment methodology shall be approved by a panel constituted at Institute level and published to the learners before the commencement of the semester.

List of General Education Elective Courses (GEXX)

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
GEA01	Voice Culture for Professional Speaking	Theory	2	25	-	50	075
GEA02	Various Dance Forms	Theory	2	25	-	50	075
GEA03	Exploring Indian Art	Theory	2	25	-	50	075
GESB02	Universal Human Values	Theory	2	25	-	50	075
GESB03	Indian Traditional Knowledge System	Theory	2	25	-	50	075
GESB04	Corporate and Social Etiquettes	Theory	2	25	-	50	075
GESB05	Global Citizenship Education	Theory	2	25	-	50	075
GESB06	Responsibility towards sustainable environment	Theory	2	25	-	50	075
GESB07	Psychology	Theory	2	25	-	50	075
GECI02	Innovation and Entrepreneurship	Theory	2	25	-	50	075
GEPS01	Indian Constitution	Theory	2	25	-	50	075
GEPS02	Four Pillars of Democratic Nation	Theory	2	25	-	50	075
GEPEW01	Wellness – Body, Mind & Spirit	Theory	2	25	-	50	075
GEPEW02	IQ vs EQ	Theory	2	25	-	50	075
GEPEW03	Nutrition and Physical Wellness	Theory	2	25	-	50	075
GEF01	Basics of Finance & Legal aspects for Business	Theory	2	25	-	50	075
GEF02	Financial Management for beginners	Theory	2	25	-	50	075
GENS01	Facets of Astronomy	Theory	2	25	-	50	075
GENS02	Modern Farming	Theory	2	25	-	50	075
GEWI01	Railways - Wonders of Infrastructure	Theory	2	25	-	50	075

Second Year B. Tech. Electronics and Computer Science   **Semester: III**
Course Structure and Assessment Guidelines

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40%
Code	Name			ISA	MSE	ESE	of total marks)
HS03	Technical and Business Writing	Theory+ Practical	2	75	-	-	075
BS06	Engineering Mathematics-III	Theory	3	20	30	50	100
EC01T	Electronic Devices and Circuits	Theory	2	15	20	40	075
EC01P	Electronic Devices and Circuits Lab	Practical	1	25	-	25	050
EC02T	Electrical Circuit Analysis	Theory	2	15	20	40	075
EC02P	Electrical Circuit Analysis Lab	Practical	1	25	-	25	050
EC03T	Data Structures and Algorithms	Theory	2	15	20	40	075
EC03P	Data Structures and Algorithms Lab	Practical	1	25	-	25	050
EC09T	Python Programming	Theory	2	15	20	40	075
EC09P	Python Programming Lab	Practical	1	25	-	25	050
GESB01#	Social Service Internship/ Project	Practical	3	-	-	100	100
Total			**20**				

ISA=In Semester Assessment, MSE= Mid Semester Examination, ESA= End Semester Examination
 # For GESB01- Social Service Internship/ Project: 2 hours / week slot will be provided during the semester (in regular timetable). Additional work of 60 hours needs to be completed during the semester (besides regular timetable) or after the semester (during inter-semester break).
NOTE: As per Institute guidelines, the result of courses completed in inter-semester break will appear in the marksheet of the next semester.

The assessment guidelines for the courses of different credits are mentioned above. Notwithstanding the above, each course faculty shall have the choice to propose her/his assessment methodology based on the nature of the course. However, the proposed assessment.tent methodology shall be approved by a panel constituted at Institute level and published to the learners before the commencement of the semester.

Second Year B. Tech. Electronics and Computer Science **Semester: IV**
Course Structure and Assessment Guidelines

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
HS06	Principles of Economics and Management	Theory + Tutorial	3	40	20	40	100
BS08	Engineering Mathematics-IV	Theory	3	20	30	50	100
EC04T	Computer Organization & Architecture	Theory	2	15	20	40	075
EC04P	Computer Organization & Architecture Lab	Practical	1	25	-	25	050
EC05T	Control Systems Engineering	Theory	2	15	20	40	075
EC05P	Control Systems Engineering Lab	Practical	1	25	-	25	050
EC06T	Signals and Systems	Theory	2	15	20	40	075
EC06P	Signals and Systems Lab	Practical	1	25	-	25	050
EC07T	Web Technology	Theory	2	15	20	40	075
EC07P	Web Technology Lab	Practical	1	25	-	25	050
EC08T	Database Management System	Theory	2	15	20	40	075
EC08P	Database Management System Lab	Practical	1	25	-	25	050
Total			**21**				
Course credits completed during the previous inter semester break will appear in this semester's marksheet							
GESB01	Social Service Internship/ Project	Practical	3	-	-	100	100

ISA=In Semester Assessment, MSE= Mid Semester Examination, ESA= End Semester Examination

The assessment guidelines for the courses of different credits are mentioned above. Notwithstanding the above, each course faculty shall have the choice to propose her/his assessment methodology based on the nature of the course. However, the proposed assessment methodology shall be approved by a panel constituted at Institute level and published to the learners before the commencement of the semester.

Second Year B. Tech. Electronics and Computer Science - Summer Break

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
GE01$	Internship with other Institutes (Credit Transfer)	As per course	4	-	-	125	125

$ **For GE01- Internship with other Institutes (Credit Transfer):** Internship with other reputed institutes equivalent to 4 credits is recommended to be done by learner during second year inter semester break (i.e. summer break between semester 4 and semester 5).

NOTE: As per Institute guidelines, the results of courses completed in inter-semester break will appear in the marksheet of the next semester.

Third Year B. Tech. Electronics and Computer Science   **Semester: V**
Course Structure and Assessment Guidelines

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
HS04	Presentation Skills	Practical	1	50	-	-	050
BS12	Engineering Mathematics-V	Theory	3	20	30	50	100
EC10T	Basic VLSI Design	Theory	2	15	20	40	075
EC10P	Basic VLSI Design Lab	Practical	1	25	-	25	050
EC11T	Microcontroller and Applications	Theory	2	15	20	40	075
EC11P	Microcontroller and Applications Lab	Practical	1	25	-	25	050
EC12T	Operating System	Theory	2	15	20	40	075
EC12P	Operating System Lab	Practical	1	25	-	25	050
EC13T	Analysis of Algorithms	Theory	2	15	20	40	075
EC13P	Analysis of Algorithms Lab	Practical	1	25	-	25	050
EC45	Mini Project	Practical	2	25	-	50	075
ECXX	Professional Elective-1	As Per Course	3	As Per Course			
Total			**21**				
Course credits completed during the previous inter semester break will appear in this semester's marksheet							
GE01	Internship with other Institutes (Credit Transfer)	As per course	4	-	-	125	125

ISA=In Semester Assessment, MSE= Mid Semester Examination, ESA= End Semester Examination

The assessment guidelines for the courses of different credits are mentioned above. Notwithstanding the above, each course faculty shall have the choice to propose her/his assessment methodology based on the nature of the course. However, the proposed assessment methodology shall be approved by a panel constituted at Institute level and published to the learners before the commencement of the semester.

Guidelines for Professional Elective Courses and Specialization Certificate – Refer Appendix-A

Learners are required to go through Appendix-A carefully before selecting the Professional Elective courses. Detailed guidelines regarding Professional Elective courses, specialization tracks and courses relevant to each track are given in Appendix-A.

Professional Elective -1 Courses (ECXX)

Specialization Track Name#	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
Artificial Intelligence and Machine Learning (AIML)	EC21T	Artificial Intelligence	Theory	2	15	20	40	075
	EC21P	Artificial Intelligence lab	Practical	1	25	-	25	050
Data Science (DA)	EC22T	Advanced Database Management System	Theory	2	15	20	40	075
	EC22P	Advanced Database Management System Lab	Practical	1	25	-	25	050
Internet of Things (IoT)	EC23T	Modern Sensors for IOT	Theory	2	15	20	40	075
	EC23P	Modern Sensors for IOT Lab	Practical	1	25	-	25	050
Very Large-Scale Integration (VLSI)	EC24T	Digital System Design	Theory	2	15	20	40	075
	EC24P	Digital System Design Lab	Practical	1	25	-	25	050

#For details of Specialization Certificate, refer Appendix-A

Guidelines for Awrad of Honours/Minor Degree

Before the end of Semester 5, learners are required to go through the Honours/Minor Degree pragramme document carefully to opt for Honours/ Minor Degree programme. Learners willing to opt for Honours/ Minor Degree programme are required to satisfy the eligibility criteria stated in the document.

Third Year B. Tech. Electronics and Computer Science   **Semester: VI**
Course Structure and Assessment Guidelines

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
EC14T	Digital Image Processing	Theory	2	15	20	40	075
EC14P	Digital Image Processing Lab	Practical	1	25	-	25	050
EC15T	Theory of Computer Science	Theory + Tutorial	3	40	20	40	100
EC16T	Computer Networks	Theory	2	15	20	40	075
EC16P	Computer Networks Lab	Practical	1	25	-	25	050
EC17T	Analog & Digital Communications	Theory	2	15	20	40	075
EC17P	Analog & Digital Communications Lab	Practical	1	25	-	25	050
ECXX	Professional Elective-2	As Per Course	3	As Per Course			
ECXX	Professional Elective-3	As Per Course	3	As Per Course			
Total			**18**				

ISA=In Semester Assessment, MSE= Mid Semester Examination, ESA= End Semester Examination

The assessment guidelines for the courses of different credits are mentioned above. Notwithstanding the above, each course faculty shall have the choice to propose her/his assessment methodology based on the nature of the course. However, the proposed assessment methodology shall be approved by a panel constituted at Institute level and published to the learners before the commencement of the semester.
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Professional Elective - 2 Courses (ECXX)

Specialization Track Name#	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
Artificial Intelligence and Machine Learning (AIML)	EC25T	Soft Computing	Theory	2	15	20	40	075
	EC25P	Soft Computing Lab	Practical	1	25	-	25	050
Data Science (DS)	EC26T	Data Warehousing and Mining	Theory	2	15	20	40	075
	EC26P	Data Warehousing and Mining Lab	Practical	1	25	-	25	050
Internet of Things (IoT)	EC27T	Principles of IOT	Theory	2	15	20	40	075
	EC27P	Principles of IOT Lab	Practical	1	25	-	25	050
Very Large-Scale Integration (VLSI)	EC28T	Advanced VLSI Design and Technology	Theory	2	15	20	40	075
	EC28P	Advanced VLSI Design and Technology Lab	Practical	1	25	-	25	050

#For details of Specialization Certificate, refer Appendix-A

Professional Elective - 3 Courses (ECXX)

Specialization Track Name#	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
Artificial Intelligence and Machine Learning (AIML)	EC29T	Machine Learning	Theory	2	15	20	40	075
	EC29P	Machine Learning Lab	Practical	1	25	-	25	050

Data Science (DS)	EC30T	Probabilistic Graphical Models	Theory	2	15	20	40	075
	EC30P	Probabilistic Graphical Models Lab	Practical	1	25	-	25	050
Internet of Things (IoT)	EC31T	Embedded System Design with tiny OS	Theory	2	15	20	40	075
	EC31P	Embedded System Design with tiny OS Lab	Practical	1	25	-	25	050
Very Large-Scale Integration (VLSI)	EC32T	Analog IC Design	Theory	2	15	20	40	075
	EC32P	Analog IC Design Lab	Practical	1	25	-	25	050

#For details of Specialization Certificate, refer Appendix-A

Third Year B. Tech. Electronics and Computer Science - Summer Break

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
EC46*	Industry Internship	Practical	5	75	-	75	150

*150+ hours of industry internship to be done during inter semester break between semester 6 and semester 7.

NOTE: As per Institute guidelines, the results of courses completed in inter-semester break will appear in the marksheet of the next semester.

Final Year B. Tech. Electronics and Computer Science   **Semester: VII**
Course Structure and Assessment Guidelines

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
ECXX	Professional Elective-4	As Per Course	3	As Per Course			
ECXX	Professional Elective-5	As Per Course	3	As Per Course			
ECXX	Professional Elective-6	As Per Course	3	As Per Course			
OEXX*	Any two from the offered Open Elective Courses	Theory	3	20	30	50	100
OEXX*		Theory	3	20	30	50	100
EC47	Project-1 (Synopsis)	Theory	3	50	-	50	100
Total			**18**				
Course credits completed during the previous inter semester break will appear in this semester's marksheet							
EC46	Industry Internship	Practical	5	75	-	75	150

ISA=In Semester Assessment, MSE= Mid Semester Examination, ESA= End Semester Examination

*Selection is based on subset of OE courses offered by the Institute for the semester.

The assessment guidelines for the courses of different credits are mentioned above. Notwithstanding the above, each course faculty shall have the choice to propose her/his assessment methodology based on the nature of the course. However, the proposed assessment methodology shall be approved by a panel constituted at Institute level and published to the learners before the commencement of the semester.

Professional Elective - 4 Courses (ECXX)

Specialization Track Name#	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
Artificial Intelligence and Machine Learning (AIML)	EC33T	Data Analytics & Visualization	Theory	2	15	20	40	075
	EC33P	Data Analytics & Visualization Lab	Practical	1	25	-	25	050
Data Science (DA)	EC34T	Big Data Analytics	Theory	2	15	20	40	075
	EC34P	Big Data Analytics Lab	Practical	1	25	-	25	050

Internet of Things (IoT)	EC35T	IoT and Edge Computing	Theory	2	15	20	40	075
	EC35P	IoT and Edge Computing	Practical	1	25	-	25	050
Very Large-Scale Integration (VLSI)	EC36T	ASIC and Verification	Theory	2	15	20	40	075
	EC36P	ASIC and Verification Lab	Practical	1	25	-	25	050

#For details of Specialization Certificate, refer Appendix-A

Professional Elective - 5 Courses (ECXX)

Specialization Track Name#	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
Artificial Intelligence and Machine Learning (AIML)	EC37T	Deep Learning	Theory	2	15	20	40	075
	EC37P	Deep Learning Lab	Practical	1	25	-	25	050
Data Science (DS)	EC38T	Recommendation Systems	Theory	2	15	20	40	075
	EC38P	Recommendation Systems Lab	Practical	1	25	-	25	050
Internet of Things (IoT)	EC39T	IoT Security and Trust	Theory	2	15	20	40	075
	EC39P	IoT Security and Trust Lab	Practical	1	25	-	25	050
Very Large-Scale Integration (VLSI)	EC40T	System on Chip	Theory	2	15	20	40	075
	EC40P	System on Chip Lab	Practical	1	25	-	25	050

#For details of Specialization Certificate, refer Appendix-A

Professional Elective - 6 Courses (ECXX)

Specialization Track Name#	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
Artificial Intelligence and Machine Learning (AIML)	EC41T	Natural language processing	Theory	2	15	20	40	075
	EC41P	Natural language processing Lab	Practical	1	25	-	25	050
Data Science (Ds)	EC42T	Text, Web & Social Media Analytics	Theory	2	15	20	40	075
	EC42P	Text, Web & social media Analytics Lab	Practical	1	25	-	25	050
Internet of Things (IoT)	EC43T	Industrial IOT	Theory	2	15	20	40	075
	EC43P	Industrial IOT Lab	Practical	1	25	-	25	050
Very Large-Scale Integration (VLSI)	EC44T	Mixed Signal VLSI	Theory	2	15	20	40	075
	EC44P	Mixed Signal VLSI Lab	Practical	1	25	-	25	050

#For details of Specialization Certificate, refer Appendix-A

Open Elective Courses (OEXX)

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
OE21	Cyber Law	Theory	3	20	30	50	100
OE22	Project Management	Theory	3	20	30	50	100
OE23	Product Lifecycle Management	Theory	3	20	30	50	100
OE24	Sustainability Management	Theory	3	20	30	50	100
OE25	Operation Research	Theory	3	20	30	50	100
OE26	IPR and Patenting	Theory	3	20	30	50	100
OE27	Research Methodology	Theory	3	20	30	50	100
OE28	Renewable Energy Management	Theory	3	20	30	50	100
OE29	Energy Audit and Management	Theory	3	20	30	50	100
OE30	Bioinformatics	Theory	3	20	30	50	100
OE31	Nanotechnology	Theory	3	20	30	50	100

Final Year B. Tech. Electronics and Computer Science   **Semester: VIII**
Course Structure and Assessment Guidelines

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
OEXX*	Any three from	Theory	3	20	30	50	100
OEXX*	the offered Open	Theory	3	20	30	50	100
OEXX*	Elective courses	Theory	3	20	30	50	100
EC48	Project 2 – (Final)	Theory + Practical	6	100	-	75	175
Total			**15**				

ISA=In Semester Assessment, MSE= Mid Semester Examination, ESA= End Semester Examination
*Selection is based on subset of OE courses offered by the Institute for the semester.

The assessment guidelines for the courses of different credits are mentioned above. Notwithstanding the above, each course faculty shall have the choice to propose her/his assessment methodology based on the nature of the course. However, the proposed assessment methodology shall be approved by a panel constituted at Institute level and published to the learners before the commencement of the semester.

Open Elective Courses (OEXX)

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
OE21	Cyber Law	Theory	3	20	30	50	100
OE22	Project Management	Theory	3	20	30	50	100
OE23	Product Lifecycle Management	Theory	3	20	30	50	100
OE24	Sustainability Management	Theory	3	20	30	50	100
OE25	Operation Research	Theory	3	20	30	50	100
OE26	IPR and Patenting	Theory	3	20	30	50	100
OE27	Research Methodology	Theory	3	20	30	50	100
OE28	Renewable Energy Management	Theory	3	20	30	50	100
OE29	Energy Audit and Management	Theory	3	20	30	50	100
OE30	Bioinformatics	Theory	3	20	30	50	100
OE31	Nanotechnology	Theory	3	20	30	50	100

Appendix-A

Guidelines for Professional Elective Courses and Specialization Certificate

Professional Elective courses are designed to meet industrial requirements. All learners must opt for 6 professional elective courses (both Theory and Practical component) as a part of the requirement for B.Tech. Degree.

Specialization Certificate is introduced in order to build competency of learners in the chosen domain. Department of Electronics and Computer Science offers the following specialization tracks:

1. Artificial Intelligence and Machine Learning (AIML)
2. Data Science (DS)
3. Internet of Things (IoT)
4. Very Large-Scale Integration (VLSI)

Learners can take courses from any track. **However, if learners complete all Professional Elective courses from the same chosen track, they will be eligible to receive a Specialization Certificate from the Institute.**

Learners who choose professional elective courses from different specialization tracks will not be eligible for a Specialization Certificate.

It should be noted that there are no additional credit requirements for these specializations.

AIML track: Courses to be chosen for specialization in Artificial Intelligence and Machine Learning

Semester	Course Code	Course Name
V	EC21T	Artificial Intelligence
V	EC21P	Artificial Intelligence Lab
VI	EC25T	Soft Computing
VI	EC25P	Soft Computing Lab
VI	EC29T	Machine Learning
VI	EC29P	Machine Learning Lab
VII	EC33T	Data Analytics & Visualization
VII	EC33P	Data Analytics & Visualization Lab
VII	EC37T	Deep Learning
VII	EC37P	Deep Learning Lab
VII	EC41T	Natural language processing
VII	EC41P	Natural language processing Lab

DA track: Courses to be chosen for specialization in Data Analytics

Semester	Course Code	Course Name
V	EC22T	Advanced Database Management
V	EC22P	Advanced Database Management Lab
VI	EC26T	Data Warehousing and Mining
VI	EC26P	Data Warehousing and Mining Lab
VI	EC30T	Probabilistic Graphical Models
VI	EC30P	Probabilistic Graphical Models Lab
VII	EC34T	Big Data Analytics
VII	EC34P	Big Data Analytics Lab
VII	EC38T	Recommendation Systems
VII	EC38P	Recommendation Systems Lab
VII	EC42T	Text, Web & Social Media Analytics
VII	EC42P	Text, Web & social media Analytics Lab

IoT track: Courses to be chosen for specialization in Internet of Things

Semester	Course Code	Course Name
V	EC23T	Modern Sensors for IOT
V	EC23P	Modern Sensors for IOT Lab
VI	EC27T	Principles of IOT
VI	EC27P	Principles of IOT Lab
VI	EC31T	Embedded System Design with tiny OS
VI	EC31P	Embedded System Design with tiny OS Lab
VII	EC35T	IoT and Edge Computing
VII	EC35P	IoT and Edge Computing Lab
VII	EC39T	IoT Security and Trust
VII	EC39P	IoT Security and Trust Lab
VII	EC43T	Industrial IOT
VII	EC43P	Industrial IOT Lab

VLSI track: Courses to be chosen for specialization in Very Large-Scale Integration

Semester	Course Code	Course Name
V	EC24T	Digital System Design
V	EC24P	Digital System Design Lab
VI	EC28T	Advanced VLSI Design and Technology
VI	EC28P	Advanced VLSI Design and Technology Lab
VI	EC32T	Analog IC Design
VI	EC32P	Analog IC Design Lab
VII	EC36T	ASIC and Verification
VII	EC36P	ASIC and Verification Lab
VII	EC40T	System on Chip
VII	EC40P	System on Chip Lab
VII	EC44T	Mixed Signal VLSI
VII	EC44P	Mixed Signal VLSI Lab