Vidyalankar Institute of Technology

An Autonomous Institute affiliated to University of Mumbai

Bachelor of Technology

in

Electronics and Computer Science

Programme Structure (R-2023)

(As per NEP 2020, with effect from the Academic Year 2023-24)

Preamble

The National Education Policy (NEP) framework aims to break the mold from teacher centric to student centric educational practices. It empowers the students with flexibility in terms of choosing courses across different faculties and modes of learning.

This multidisciplinary approach will encourage learners to follow their passion and inherent interests. The learner is free to learn at a pace that he is comfortable with, and this enables lifelong learning. It also enhances the scope for holistic personality development.

This premise is truly reflected in preamble of the NEP document, "The future of nation is decided in the classrooms of the schools and colleges today".

Details of implementation:

NEP curriculum framework enables us to accelerate change, redesign systems with equity in mind, respond to feedback, encourage collaboration, catch and pollinate ideas and create a culture of research and development. It will allow us to offer the required academic flexibility which will focus on improving competency level of students with diverse strengths.

The curriculum planned by VIT has vertical **Program Courses** consisting of Programme core courses (PCC) of branch of engineering positioned and sequenced to achieve sequential and integral learning of the entire breadth of the specific branch. This vertical also includes Programme elective courses (PEC) which 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 special feature of this curricula ensuring employability.

The vertical **Multidisciplinary Courses** consists of Open Elective (OE) courses and multidisciplinary minor (MD M) courses. Special vocational and skill development courses are included as a part of **Skill courses** vertical that make student capable to work in industrial environment.

The student is expected to demonstrate their ability through courses in **Experiential Learning Courses** vertical like internships/On Job Training, Community Engagement Project, Real Industry Project/ research problem. Our curriculum also introduces Social Service Internship and Internship with institutes abroad along with courses like Design Thinking. This will lead to the creation of products and/ or patents through this program.

For holistic development of students, apart from technical courses, Ability Enhancement Courses, Entrepreneurship/Economics/Management Courses, Indian Knowledge System and Value Education courses from vertical **Humanities and Social Science and Management** develop the required soft-skills and attitude amongst learners.

In **Liberal Learning** vertical courses like Various Dance Forms, Global citizenship Education, Facets of Astronomy etc. aim to create balance in brain hemispheres and hence improve learners' clarity in thoughts and responses.

In addition to core courses, professional and open electives; our framework offers honor degree in each programme of engineering. It includes specialized courses along with field/ domain study that make students capable of working on industry relevant problems.

Chairperson, Board of Studies
Department of Electronics and Computer Science
Vidyalankar Institute of Technology

Chairperson, Academic Council
Vidyalankar Institute of Technology

VERTICAL BASED CREDIT ALLOTMENT

Sr. No.	Verticals	Baskets	Credits
I	BSC/ESC	Basic Science	15
		Engineering Science	12
II	Program Courses	Programme Core Courses (PCC)	45
		Programme Elective Courses (PEC)	18
III	Multidisciplinary Courses	Multidisciplinary Minor (MD M)	14
		Open Electives (OE)	09
IV	Skill Courses	Vocational and Skill Enhancement Courses (VSEC)	09
V	Humanities Social Science and Management (HSSM)	Ability Enhancement Courses	05
		Entrepreneurship/Economics/Management Courses	03
		Indian Knowledge System (IKS)	02
		Value Education Courses (VEC)	03
VI	Experiential Learning Courses	Research Methodology	03
		Community Engagement Project (CEP)/Field Project (FP)	02
		Project	08
		Internship/OJT	12
VII	Liberal Learning Courses	Co-curricular Courses (CC)	04
Total			**164**

Learner is expected to complete the requirement of 164 credits (with minimum credits under each vertical and/or bucket as mentioned above) for B.Tech. degree in Electronics and Computer Science with Multidisciplinary Minor.

Additionally, learners can choose to avail i) B.Tech. in Electronics and Computer Science – Honors and Multidisciplinary Minor or ii) B.Tech. in Electronics and Computer Science - Honours with Research and Multidisciplinary Minor or iii) B.Tech. in Electronics and Computer Science with Double Minors (Multidisciplinary and Specialization Minor) Degree by completing requirements of 18 credits, which will be over and above the 164 credits required for B.Tech. with Multidisciplinary Minor degree.

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-2023 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 Baskets

I. Basic Science Courses (BSC)

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	BSC10T*	Engineering Physics	2	-	-	2	1
	BSC10P*	Engineering Physics Lab	-	2	-	1	1
2	BSC02*	Engineering Mathematics-I	3	-	-	3	1
3	BSC11T*	Engineering Chemistry	2	-	-	2	2
	BSC11P*	Engineering Chemistry Lab	-	2	-	1	2
4	BSC04*	Engineering Mathematics-II	3	-	-	3	2
5	BSC06	Engineering Mathematics-III	3	-	-	3	3

*** Courses exempted for Direct Second Year (DSY) students who will secure admission through lateral entry from the A.Y. 2024-25 onwards.**

II. Engineering Science Courses (ESC)

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	ESC01T*	Engineering Graphics	2	-	-	2	1
	ESC01P*	Engineering Graphics Lab	-	2	-	1	1
2	ESC02T*	Engineering Mechanics	2	-	-	2	1
	ESC02P*	Engineering Mechanics Lab	-	2	-	1	1
3	ESC03T*	Digital Logic Circuit	2	-	-	2	1
	ESC03P*	Digital Logic Circuit Lab	-	2	-	1	1
4	ESC09T	Computer Organization and Architecture	2	-	-	2	4
	ESC09P	Computer Organization and Architecture Lab	-	2	-	1	4

*** Courses exempted for Direct Second Year (DSY) students who will secure admission through lateral entry from the A.Y. 2024-25 onwards.**

III. Programme Core Courses (PCC)

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	PCEC01T	Electronic Devices and Circuits	2	-	-	2	3
	PCEC01P	Electronic Devices and Circuits Lab	-	2	-	1	3
2	PCEC02T	Electrical Circuit Analysis	2	-	-	2	3
	PCEC02P	Electrical Circuit Analysis Lab	-	2	-	1	3
3	PCEC03T	Data Structures	2	-	-	2	3
	PCEC03P	Data Structures Lab	-	2	-	1	3
4	PCEC04T	Control Systems Engineering	2	-	-	2	4
	PCEC04P	Control Systems Engineering Lab	-	2	-	1	4
5	PCEC05T	Signals and Systems	2	-	-	2	4
	PCEC05P	Signals and Systems Lab	-	2	-	1	4
6	PCEC06T	Web Technology	2	-	-	2	4
	PCEC06P	Web Technology Lab	-	2	-	1	4
7	PCEC07T	Database Management System	2		-	2	4
	PCEC07P	Database Management System Lab	-	2	-	1	4
8	PCEC08T	Basic VLSI Design	2	-	-	2	5
	PCEC08P	Basic VLSI Design Lab	-	2	-	1	5
9	PCEC09T	Microcontroller and Applications	2	-	-	2	5
	PCEC09P	Microcontroller and Applications Lab	-	2	-	1	5
10	PCEC10T	Operating System	2	-	-	2	5
	PCEC10P	Operating System Lab	-	2	-	1	5
11	PCEC11T	Analysis of Algorithms	2	-	-	2	5
	PCEC11P	Analysis of Algorithms Lab	-	2	-	1	5
12	PCEC12T	Theory of Computer Science	2	-	1	3	6
13	PCEC13T	Computer Networks	2	-	-	2	6
	PCEC13P	Computer Networks Lab	-	2	-	1	6
14	PCEC14T	Analog & Digital Communications	2	-	-	2	6
	PCEC14P	Analog & Digital Communications Lab	-	2	-	1	6

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
15	PCEC15T	Digital Image Processing	2	-	-	2	6
	PCEC15P	Digital Image Processing Lab	-	2	-	1	6

IV. Programme Elective Courses (PEC)

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	PEEC01T	Artificial Intelligence	2	-	-	2	5
	PEEC01P	Artificial Intelligence lab	-	2	-	1	5
2	PEEC02T	Advanced Database Management	2	-	-	2	5
	PEEC02P	Advanced Database Management Lab	-	2	-	1	5
3	PEEC03T	Modern Sensors for IOT	2	-	-	2	5
	PEEC03P	Modern Sensors for IOT Lab	-	2	-	1	5
4	PEEC04T	Digital System Design	2	-	-	2	5
	PEEC04P	Digital System Design Lab	-	2	-	1	5
5	PEEC05T	Soft Computing	2	-	-	2	6
	PEEC05P	Soft Computing Lab	-	2	-	1	6
6	PEEC06T	Data Warehousing and Mining	2	-	-	2	6
	PEEC06P	Data Warehousing and Mining Lab	-	2	-	1	6
7	PEEC07T	Principles of IOT	2	-	-	2	6
	PEEC07P	Principles of IOT Lab	-	2	-	1	6
8	PEEC08T	Advanced VLSI Design and Technology	2	-	-	2	6
	PEEC08P	Advanced VLSI Design and Technology Lab	-	2	-	1	6
9	PEEC09T	Machine Learning	2	-	-	2	6
	PEEC09P	Machine Learning Lab	-	2	-	1	6
10	PEEC10T	Probabilistic Graphical Models	2	-	-	2	6
	PEEC10P	Probabilistic Graphical Models Lab	-	2	-	1	6
11	PEEC11T	Embedded System Design with tiny OS	2	-	-	2	6

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
	PEEC11P	Embedded System Design with tiny OS Lab	-	2	-	1	6
12	PEEC12T	Analog IC Design	2	-	-	2	6
	PEEC12P	Analog IC Design Lab	-	2	-	1	6
13	PEEC13T	Data Analytics & Visualization	2	-	-	2	7
	PEEC13P	Data Analytics & Visualization Lab	-	2	-	1	7
14	PEEC14T	Big Data Analytics	2	-	-	2	7
	PEEC14P	Big Data Analytics Lab	-	2	-	1	7
15	PEEC15T	IoT and Edge Computing	2	-	-	2	7
	PEEC15P	IoT and Edge Computing	-	2	-	1	7
16	PEEC16T	ASIC and Verification	2	-	-	2	7
	PEEC16P	ASIC and Verification Lab	-	2	-	1	7
17	PEEC17T	Deep Learning	2	-	-	2	7
	PEEC17P	Deep Learning Lab	-	2	-	1	7
18	PEEC18T	Recommendation Systems	2	-	-	2	7
	PEEC18P	Recommendation Systems Lab	-	2	-	1	7
19	PEEC19T	IoT Security and Trust	2	-	-	2	7
	PEEC19P	IoT Security and Trust Lab	-	2	-	1	7
20	PEEC20T	System on Chip	2	-	-	2	7
	PEEC20P	System on Chip Lab	-	2	-	1	7
21	PEEC21T	Natural language processing	2	-	-	2	7
	PEEC21P	Natural language processing Lab	-	2	-	1	7
22	PEEC22T	Text, Web & Social Media Analytics	2	-	-	2	7
	PEEC22P	Text, Web & Social Media Analytics Lab	-	2	-	1	7
23	PEEC23T	Industrial IOT	2	-	-	2	7
	PEEC23P	Industrial IOT Lab	-	2	-	1	7
24	PEEC24T	Mixed Signal VLSI	2	-	-	2	7
	PEEC24P	Mixed Signal VLSI Lab	-	2	-	1	7

V. Multidisciplinary Minor Courses (MD M)

Sr. No.	Title of MDM	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
				Theory	Practical	Tutorial		
1	For all MDM	MDM01	Skill and Competency Development 1	-	2	-	1	6
2	For all MDM	MDM02	Skill and Competency Development 2	-	2	-	1	7
3	Bioinformatics	MDMBI01	Introduction to Bioinformatics	3	-	1	4	5
		MDMBI02	Algorithms and Data Structures in Bioinformatics	3	-	1	4	6
		MDMBI03	Machine Learning Applications in Bioinformatics	3	-	1	4	7
4	Innovation, Entrepreneurship and Venture Development	MDMIE01	Foundations of Innovation and Entrepreneurship	3	-	1	4	5
		MDMIE02	Startup Planning and Development	3	-	1	4	6
		4MDMIE03	Innovation Management and Scaling Startups	3	-	1	4	7
5	Business Development, Marketing and Finance	MDMBD01	Introduction to Business Development and Marketing Principles	3	-	1	4	5
		MDMBD02	Financial Basics for Engineers and Technopreneurs	3	-	1	4	6
		MDMBD03	Strategic Marketing and Business Planning	3	-	1	4	7
6	Robotics	MDMRB01	Fundamentals of Robotics and Control	3	2	-	4	5
		MDMRB02	Machine Vision and	3	2	-	4	6

Sr. No.	Title of MDM	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
				Theory	Practical	Tutorial		
			Robotic Perception					
		MDMRB03	Intelligent Mobile Robotics	3	2	-	4	7

VI. Open Elective Courses (OE)

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	OEC01	Collaborative Inter-Institute Studies[$]	4	-	-	4	4/5
2	OEC02	Cyber Law	2	-	-	2	7/8
3	OEC03	Project Management	2	-	-	2	7/8
4	OEC04	Product Lifecycle Management	2	-	-	2	7/8
5	OEC05	Sustainability Management	2	-	-	2	7/8
6	OEC06	Renewable Energy Management	2	-	-	2	7/8
7	OEC10	Engineering Mathematics-IV	3	-	-	3	4

[$] **For OEC01-** Collaborative Inter-Institute Studies**:** Internship with other reputed institutes equivalent to 4 credits is recommended to be done by learners during second year inter semester break (i.e. summer break between semester 4 and semester 5).

VII. Vocational and Skill Enhancement Courses (VSEC)

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	VSEC01T*	Structured Programming	2	-	-	2	1
	VSEC01P*	Structured Programming Lab	-	2	-	1	
2	VSEC02T*	Object Oriented Programming	2	-	-	2	1
	VSEC02P*	Object Oriented Programming Lab	-	2	-	1	
3	VSEC04T	Python Programming	2	-	-	2	3
	VSEC04P	Python Programming Lab	-	2	-	1	

VIII. Ability Enhancement Courses (AEC)

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	AEC01T*	Effective Communication	2	-	-	2	Any Semester
	AEC01P*	Effective Communication Lab	-	2	-	1	
2	AEC02	Technical and Business Writing Lab	1	2	-	2	
3	AEC03	Presentation Skills	-	2	-	1	

IX. Entrepreneurship/Economics/Management Courses (EEMC)

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	EEMC01	Design Thinking	2	2	-	3	Any Semester
2	EEMC02	Principles of Economics and Management	2	-	1	3	

X. Indian Knowledge System (IKS)

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	IKS01	Indian Traditional Knowledge System	2	-	-	2	4
2	IKS02	Indian Constitution	2	-	-	2	4
3	IKS03	Exploring Indian Art	2	-	-	2	4

XI. Value Education Courses (VEC)

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	VEC01T	Professional Skills	2	-	-	2	Any Semester
2	VEC01P	Professional Skills Lab	-	2	-	1	
3	VEC02	E-waste and Environmental Management	2	-	-	2	
4	VEC03	Universal Human Values	2	-	-	2	
5	VEC04	Responsibility towards sustainable environment	2	-	-	2	
6	VEC05	Four Pillars of Democratic Nation	2	-	-	2	

Research Methodology (RM)

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	RM01	Research Methodology	3	-	-	3	7/8

XII. Community Engagement Project (CEP)/Field Project (FP)

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	CEP01	Social Service Internship/ Project[*]	-	60 hrs	-	2	3

[#] **For CEP01: Social Service Internship/ Project:** 2 hours / week slot will be provided during the semester (in regular timetable). Additional work of 30 hours needs to be completed during the semester (besides regular timetable) or after the semester (during inter-semester break).

XIII. Project

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	PRJEC01	Mini Project-1	-	4	-	2	5
2	PRJEC02	Projec-1 (Synopsis)	-	4	-	2	6/7
3	PRJEC03	Project-2 (Final)	-	8	-	4	7/8

XIV. Internship/OJT

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	OJT01	Industry Internship 1	-	150 Hrs (Total)	-	5	Semester Break of 6 & 7
2	OJT02	Industry Internship 2	-	210 Hrs (Total)	-	7	8

XV. Co-curricular Courses (CC)

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	CC01	Various Dance Forms	2	-	-	2	1/2
2	CC02	Corporate and Social Etiquettes	2	-	-	2	1/2
3	CC03	Global Citizenship Education	2	-	-	2	1/2
4	CC04	Wellness – Body, Mind & Spirit	2	-	-	2	1/2
5	CC05	IQ vs EQ	2	-	-	2	1/2

6	CC06	Nutrition and Physical Wellness	2	-	-	2	1/2
7	CC07	Facets of Astronomy	2	-	-	2	1/2
8	CC08	Railways - Wonders of Infrastructure	2	-	-	2	1/2
9	CC09	Financial Literacy for Engineers	2	-	-	2	1/2
10	CC10	Mastering Advanced Excel	2	-	-	2	1/2
11	CC11	Personal Grooming Essentials	2	-	-	2	1/2
12	CC12	Various Music Forms	2	-	-	2	1/2

Illustrative Semester wise
Credit Distribution Structure and Assessment Guidelines
(Based on NEP 2020 Guidelines)
for
Bachelor of Technology
in
Electronics and Computer Science with Multidisciplinary Minor

Semester		I	II	III	IV	V	VI	VII	VIII	Total Credits
Sub-Category	**Vertical**									
Basic Science Course	BSC/ ESC	6	6	3						15
Engineering Science		6	3		3					12
Programme Core Course (PCC)	Program Courses (PC)			9	12	12	9	3		45
Programme Elective Course (PEC)						3	6	9		18
Multidisciplinary Minor (MDM)	Multidisciplinary Courses (MDC)					4	4+1	4+1		14
Open Elective (OE)					3	#4			2	9
Vocational and Skill Enhancement Courses (VSEC)	Skill Courses (SC)	3	3	3						9
Ability Enhancement Courses (AEC)	Humanities Social Science and Management (HSSM)	3		2						5
Entrepreneurship/ Economics/ Management Courses (EEMC)			3							3
Indian Knowledge System (IKS)					2					2
Value Education Courses (VEC)			3							3
Research Methodology (RM)	Experiential Learning Courses (ELC)								3	3
Comm. Engg. Project (CEP)/ Field Project (FP)				2						2
Project						2	2	4		8
Internship/ OJT								#5	7	12
Co-curricular Courses (CC)	Liberal Learning Courses (LLC)	2	2							4
Total Credits		**20**	**20**	**19**	**20**	**4+21**	**22**	**5+21**	**12**	**164**

#Credits to be earned during the semester break

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

Course			Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
NEP-Verticals	Code	Name			ISA	MSE	ESE	
BSC	BSC02	Engineering Mathematics-I	Theory	3	20	30	50	100
	BSC10T	Engineering Physics	Theory	2	15	20	40	075
	BSC10P	Engineering Physics Lab	Practical	1	25	-	25	050
ESC	ESC03T	Digital Logic Circuit	Theory	2	15	20	40	075
	ESC03P	Digital Logic Circuit Lab	Practical	1	25	-	25	050
	ESC02T	Engineering Mechanics	Theory	2	15	20	40	075
	ESC02P	Engineering Mechanics Lab	Practical	1	25	-	25	050
SC	VSEC01T	Structured Programming	Theory	2	15	20	40	075
	VSEC01P	Structured Programming Lab	Practical	1	25	-	25	050
HSSM	AEC01T	Effective Communication	Theory	2	15	20	40	075
	AEC01P	Effective Communication Lab	Practical	1	25	-	25	050
LLC	CCxx	Any one CC course offered in the semester	As per Course	2	25	-	50	075
Total Credits				**20**				

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

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

Course			Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
NEP-Vertical	Code	Name			ISA	MSE	ESE	
BSC	BSC04	Engineering Mathematics-II	Theory+ Tutorial	3	20	30	50	100
	BSC11T	Engineering Chemistry	Theory	2	15	20	40	075
	BSC11P	Engineering Chemistry Lab	Practical	1	25	-	25	050
ESC	ESC01T	Engineering Graphics	Theory	2	15	20	40	075
	ESC01P	Engineering Graphics Lab	Practical	1	25	-	25	050
SC	VSEC02T	Object Oriented Programming	Theory	2	15	20	40	075
	VSEC02P	Object Oriented Programming Lab	Practical	1	25	-	25	050
HSSM	VEC01T	Professional Skills	Theory	2	15	20	40	075
	VEC01P	Professional Skills Lab	Practical	1	25	-	25	050
HSSM	EEMC01	Design Thinking	Theory + Practical	3	-	-	125	125
LLC	CCxx	Any one CC offered in the semester	As per course	2	25	-	50	075
Total Credits				**20**				

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 **Preferred Semester: III**

Course Structure and Assessment Guidelines

Course			Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40 % of total marks)
NEP-Vertical	Code	Name			ISA	MSE	ESE	
HSSM	AEC02	Technical and Business Writing	Theory + Practical	2	75	-	-	075
BSC	BSC06	Engineering Mathematics-III	Theory	3	20	30	50	100
PC-PCC	PCEC01T	Electronic Devices and Circuits	Theory	2	15	20	40	075
	PCEC01P	Electronic Devices and Circuits Lab	Practical	1	25	-	25	050
PC-PCC	PCEC02T	Electrical Circuit Analysis	Theory	2	15	20	40	075
	PCEC02P	Electrical Circuit Analysis Lab	Practical	1	25	-	25	050
PC-PCC	PCEC03T	Data Structures	Theory	2	15	20	40	075
	PCEC03P	Data Structures Lab	Practical	1	25	-	25	050
SC	VSEC04T	Python Programming	Theory	2	15	20	40	075
	VSEC04P	Python Programming Lab	Practical	1	25	-	25	050
ELC	CEP01	Social Service Internship	As per course	2	-	-	75	075
Total Credits				**19**				

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

[#]**For CEP01- Social Service Internship:** 2 hours / week slot will be provided during the semester (in regular timetable). Additional work of 30 hours needs to be completed during the semester (besides the regular timetable) or after the semester (during inter-semester break).

NOTE: As per Institute guidelines, the results 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 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 **Preferred Semester: IV**
Course Structure and Assessment Guidelines

Course			Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
NEP-Vertical	Code	Name			ISA	MSE	ESE	
HSSM	IKSxx	Any one IKS course offered in the semester	Theory	2	25	-	50	075
MC-OE	OEC10	Engineering Mathematics-IV	Theory	3	20	30	50	100
ESC	ESC09T	Computer Organization & Architecture	Theory	2	15	20	40	075
	ESC09P	Computer Organization & Architecture Lab	Practical	1	25	-	25	050
PC-PCC	PCEC04T	Control Systems Engineering	Theory	2	15	20	40	075
	PCEC04P	Control Systems Engineering Lab	Practical	1	25	-	25	050
PC-PCC	PCEC05T	Signals and Systems	Theory	2	15	20	40	075
	PCEC05P	Signals and Systems Lab	Practical	1	25	-	25	050
PC-PCC	PCEC06T	Web Technology	Theory	2	15	20	40	075
	PCEC06P	Web Technology Lab	Practical	1	25	-	25	050
PC-PCC	PCEC07T	Database Management System	Theory	2	15	20	40	075
	PCEC07P	Database Management System Lab	Practical	1	25	-	25	050
Total Credits				**20**				

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

Third Year B. Tech. Electronics and Computer Science **Preferred Semester: V**

Course Structure and Assessment Guidelines

Course			Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
NEP-Vertical	Code	Name			ISA	MSE	ESE	
MC-MDM	MDMxx	Multidisciplinary Minor Course-1	Theory	4	45	30	50	125
PC-PCC	PCEC08T	Basic VLSI Design	Theory	2	15	20	40	075
	PCEC08P	Basic VLSI Design Lab	Practical	1	25	-	25	050
PC-PCC	PCEC09T	Microcontroller and Applications	Theory	2	15	20	40	075
	PCEC09P	Microcontroller and Applications Lab	Practical	1	25	-	25	050
PC-PCC	PCEC10T	Operating System	Theory	2	15	20	40	075
	PCEC10P	Operating System Lab	Practical	1	25	-	25	050
PC-PCC	PCEC11T	Analysis of Algorithms	Theory	2	15	20	40	075
	PCEC11P	Analysis of Algorithms Lab	Practical	1	25	-	25	050
PC-PEC	PEECxxT	Programme Elective-1	Theory	2	15	20	40	075
	PEECxxP	Programme Elective-1 Lab	Practical	1	25	-	25	050
ELC	PRJEC01	Mini Project 1	Practical	2	25	-	50	075
Total Credits				**21**				
Course credits completed during the previous inter semester break will appear in this semester's marksheet								
MC-OE	OEC01[$]	Collaborative Inter-Institute Studies	As per course	4	125	-	-	125

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

[$] **For Collaborative Inter-Institute Studies:** Collaboration 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 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 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

Important Note: 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

Programme Elective -1 Courses (PEECXX)

Course Code	Course Name	Specialization Track Name#
PEEC01T	Artificial Intelligence	Artificial Intelligence & Machine Learning
PEEC01P	Artificial Intelligence lab	
PEEC02T	Advanced Database Management	Data Science
PEEC02P	Advanced Database Management Lab	
PEEC03T	Modern Sensors for IOT	Internet of Things
PEEC03P	Modern Sensors for IOT Lab	
PEEC04T	Digital System Design	VLSI Design
PEEC04P	Digital System Design Lab	

#For details of Specialization Certificate, refer Appendix-A

Guidelines for Multidisciplinary Elective Courses and Minor Degree – Refer Appendix-B (Programme Structure R 2024)

Learners are required to go through the Appendix-B carefully before selecting the Multidisciplinary Elective courses. Detailed guidelines regarding Multidisciplinary Elective courses, Minor Degree Titles and courses relevant to each MDM Title are given in Appendix-B of Programme Structure.

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

Course			Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
NEP-Vertical	Code	Name			ISA	MSE	ESE	
PC-PCC	PCEC12T	Theory of Computer Science	Theory + Tutorial	3	40	20	40	100
PC-PCC	PCEC13T	Computer Networks	Theory	2	15	20	40	075
	PCEC13P	Computer Networks Lab	Practical	1	25	-	25	050
PC-PCC	PCEC14T	Analog & Digital Communications	Theory	2	15	20	40	075
	PCEC14P	Analog & Digital Communications Lab	Practical	1	25	-	25	050
PC-PEC	PEECXXT	Programme Elective-2	Theory	2	15	20	40	075
	PEECXXP	Programme Elective-2 Lab	Practical	1	25	-	25	050
PC-PEC	PEECXXT	Programme Elective-3	Theory	2	15	20	40	075
	PEECXXP	Programme Elective-3 Lab	Practical	1	25	-	25	050
MC-MDM	MDMxx	Multidisciplinary Minor Course-2	Theory	4	45	30	50	125
MC-MDM	MDM01	Skill and Competency Development 1	Practical	1	50	-	-	050
ELC	PRJ02	Project-1 (Synopsis)	Theory+ Practical	2	50	-	25	075
Total Credits				**22**				

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.

Programme Elective - 2 Courses (PEECXX)

Course Code	Course Name	Specialization Track Name#
PEEC05T	Soft Computing	Artificial Intelligence & Machine Learning
PEEC05P	Soft Computing Lab	
PEEC06T	Data Warehousing and Mining	Data Science
PEEC06P	Data Warehousing and Mining Lab	
PEEC07T	Principles of IOT	Internet of Things
PEEC07P	Principles of IOT Lab	
PEEC08T	Advanced VLSI Design and Technology	VLSI Design
PEEC08P	Advanced VLSI Design and Technology Lab	

#For details of Specialization Certificate, refer Appendix-A

Programme Elective - 3 Courses (PEECXX)

Course Code	Course Name	Specialization Track Name#
PEEC09T	Machine Learning	Artificial Intelligence & Machine Learning
PEEC09P	Machine Learning Lab	
PEEC10T	Probabilistic Graphical Model	Data Science
PEEC10P	Probabilistic Graphical Model Lab	
PEEC11T	Embedded System Design with tiny OS	Internet of Things
PEEC11P	Embedded System Design with tiny OS Lab	
PEEC12T	Analog IC Design	VLSI Design
PEEC12P	Analog IC Design Lab	

#For details of Specialization Certificate, refer Appendix-A

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

Course			Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
NEP-Vertical	Code	Name			ISA	MSE	ESE	
PC-PCC	PCEC15T	Digital Image Processing	Theory	2	15	20	40	075
	PCEC15P	Digital Image Processing Lab	Practical	1	25	-	25	050
PC-PEC	PEECXXT	Programme Elective-4	Theory	2	15	20	40	075
	PEECXXP	Programme Elective-4 Lab	Practical	1	25	-	25	050
PC-PEC	PEECXXT	Programme Elective-5	Theory	2	15	20	40	075
	PEECXXP	Programme Elective-5 Lab	Practical	1	25	-	25	050
PC-PEC	PEECXXT	Programme Elective-6	Theory	2	15	20	40	075
	PEECXXP	Programme Elective-6 Lab	Practical	1	25	-	25	050
MC-MDM	MDMxx	Multidisciplinary Minor Course-3	Theory	4	45	30	50	125
MC-MDM	MDM02	Skill and Competency Development 2	Practical	1	50	-	-	050
ELC	PRJEC03	Project 2 – (Final)	Theory + Practical	4	75	-	50	125
Total Credits				**21**				
Course credits completed during the previous inter semester break will appear in this semester's marksheet								
ELC	OJT01*	Industry Internship-1	-	5	75	-	75	150

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

*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.

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.

Programme Elective - 4 Courses (PEECXX)

Course Code	Course Name	Specialization Track Name#
PEEC13T	Data Analytics & Visualization	Artificial Intelligence & Machine Learning
PEEC13P	Data Analytics & Visualization Lab	
PEEC14T	Big Data Analytics	Data Science
PEEC14P	Big Data Analytics Lab	
PEEC15T	IoT and Edge Computing	Internet of Things
PEEC15P	IoT and Edge Computing	
PEEC16T	ASIC and Verification	VLSI Design
PEEC16P	ASIC and Verification Lab	

#For details of Specialization Certificate, refer Appendix-A

Programme Elective - 5 Courses (PEECXX)

Course Code	Course Name	Specialization Track Name#
PEEC17T	Deep Learning	Artificial Intelligence & Machine Learning
PEEC17P	Deep Learning Lab	
PEEC18T	Recommendation Systems	Data Science
PEEC18P	Recommendation Systems Lab	
PEEC19T	IoT Security and Trust	Internet of Things
PEEC19P	IoT Security and Trust Lab	
PEEC20T	System on Chip	VLSI Design
PEEC20P	System on Chip Lab	

#For details of Specialization Certificate, refer Appendix-A

Programme Elective - 6 Courses (PEECXX)

Course Code	Course Name	Specialization Track Name#
PEEC21T	Natural language processing	Artificial Intelligence & Machine Learning
PEEC21P	Natural language processing Lab	
PEEC22T	Text, Web & Social Media Analytics	Data Science
PEEC22P	Text, Web & social media Analytics Lab	
PEEC23T	Industrial IOT	Internet of Things
PEEC23P	Industrial IOT Lab	
PEEC24T	Mixed Signal VLSI	VLSI Design
PEEC24P	Mixed Signal VLSI Lab	

#For details of Specialization Certificate, refer Appendix-A

Final Year B. Tech. Electronics and Computer Science **Preferred Semester: VIII**

Course Structure and Assessment Guidelines

Course			Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
NEP-Vertical	Code	Name			ISA	MSE	ESE	
MC-OE	OECxx[#]	Any one open elective course offered in the semester	Theory	2	15	20	40	075
ELC	RM01	Research Methodology	Theory	3	20	30	50	100
ELC	OJT02[*]	Industry Internship-2	-	7	100	-	100	200
Total Credits				**12**				

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.

[*]200+ hours of industry internship to be done during semester VIII.

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.

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 Computer Engineering offers the following specialization tracks:

1. Artificial Intelligence and Machine Learning (AIML)
2. Data Science (DS)
3. Internet of Things (IoT)
4. VLSI Design (VLSID)

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	PEEC01T	Artificial Intelligence
V	PEEC01P	Artificial Intelligence Lab
VI	PEEC05T	Soft Computing
VI	PEEC05P	Soft Computing Lab
VI	PEEC09T	Machine Learning
VI	PEEC09P	Machine Learning Lab
VII	PEEC13T	Data Analytics & Visualization
VII	PEEC13P	Data Analytics & Visualization Lab
VII	PEEC17T	Deep Learning
VII	PEEC17P	Deep Learning Lab
VII	PEEC21T	Natural language processing
VII	PEEC21P	Natural language processing Lab

DS track: Courses to be chosen for specialization in Data Science

Semester	Course Code	Course Name
V	PEEC02T	Advance Database Management
V	PEEC02P	Advance Database Management Lab
VI	PEEC06T	Data Warehousing and Mining
VI	PEEC06P	Data Warehousing and Mining Lab
VI	PEEC10T	Probabilistic Graphical Models
VI	PEEC10P	Probabilistic Graphical Models Lab
VII	PEEC14T	Big Data Analytics
VII	PEEC14P	Big Data Analytics Lab
VII	PEEC18T	Recommendation Systems
VII	PEEC18P	Recommendation Systems Lab
VII	PEEC22T	Text, Web & Social Media Analytics
VII	PEEC22P	Text, Web & Social Media Analytics Lab

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

Semester	Course Code	Course Name
V	PEEC03T	Modern Sensors for IOT
V	PEEC03P	Modern Sensors for IOT Lab
VI	PEEC07T	Principles of IOT
VI	PEEC07P	Principles of IOT Lab
VI	PEEC11T	Embedded System Design with tiny OS
VI	PEEC11P	Embedded System Design with tiny OS Lab
VII	PEEC15T	IoT and Edge Computing
VII	PEEC15P	IoT and Edge Computing Lab
VII	PEEC19T	IoT Security and Trust
VII	PEEC19P	IoT Security and Trust Lab
VII	PEEC23T	Industrial IOT
VII	PEEC23P	Industrial IOT Lab

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

Semester	Course Code	Course Name
V	PEEC04T	Digital System Design
V	PEEC04P	Digital System Design Lab
VI	PEEC08T	Advanced VLSI Design and Technology
VI	PEEC08P	Advanced VLSI Design Technology Lab
VI	PEEC12T	Analog IC Design
VI	PEEC12P	Analog IC Design Lab
VII	PEEC16T	ASIC and Verification
VII	PEEC16P	ASIC and Verification Lab
VII	PEEC20T	System on Chip
VII	PEEC20P	System on Chip Lab
VII	PEEC24T	Mixed Signal VLSI
VII	PEEC24P	Mixed Signal VLSI

Appendix-B

Guidelines for Multidisciplinary Elective Courses and Minor Degree

In alignment with the NEP objectives and the evolving demands of the engineering profession, the introduction of a Multidisciplinary Minor Degree within the Undergraduate Engineering Programme aims to foster academic breadth, innovation, and cross-domain competency. These guidelines are formulated to support the structured integration of multidisciplinary elective courses, enabling students to pursue focused study in areas beyond their core engineering discipline.
The Department of Electronics and Computer Science offers the following Multidisciplinary Minor Degree Titles for B.Tech. Biomedical Engineering students:

1. Bioinformatics (BI)
2. Innovation, Entrepreneurial and Venture Development (IE)
3. Business Development, Marketing and Finance (BD)
4. Robotics (RB)

It should be noted that it is mandatory to choose one Multidisciplinary Minor (MD M) Degree Programme as a part of B.Tech. Electronics and Computer Science degree.

Bioinformatics (BI): Courses to be completed successfully for MD M in Bioinformatic.

Semester	Course Code	Course Name
V	MDMBI01	Introduction to Bioinformatics
VI	MDMBI02	Algorithms and Data Structures in Bioinformatics
VII	MDMBI03	Machine Learning Applications in Bioinformatics

Innovation, Entrepreneurial and Venture Development (IE): Courses to be completed successfully for MD M in Innovation, Entrepreneurial and Venture Development.

Semester	Course Code	Course Name
V	MDMIE01	Foundations of Innovation and Entrepreneurship
VI	MDMIE02	Startup Planning and Development
VII	MDMIE03	Innovation Management and Scaling Startups

Business Development, Marketing and Finance (BD): Courses to be completed successfully for MD M in Business Development, Marketing and Finance.

Semester	Course Code	Course Name
V	MDMBD01	Introduction to Business Development and Marketing Principles
VI	MDMBD02	Financial Basics for Engineers and Technopreneurs
VII	MDMBD03	Strategic Marketing and Business Planning

Robotics (RB): Courses to be completed successfully for MD M in Robotics (RB).

Semester	Course Code	Course Name
V	MDMRB01	Fundamentals of Robotics and Control
VI	MDMRB02	Machine Vision and Robotic Perception
VII	MDMRB03	Intelligent Mobile Robotics

For all MDM Degree courses

Semester	Course Code	Course Name
VI	MDM01	Skill and Competency Development 1
VII	MDM02	Skill and Competency Development 2