Vidyalankar Institute of Technology

An Autonomous Institute affiliated to University of Mumbai

Bachelor of Technology

in

Computer Engineering

with Multidisciplinary Minor

Programme Structure (R-2024)

(As per NEP 2020, with effect from the Academic Year 2024-25)

Preamble

The National Education Policy (NEP) framework aims to break the mould from teacher centric to student centric educational practices. It empowers the students with flexibility in terms of choosing courses across different faculties and mode 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/ she 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 Programme 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 programme 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 Courses (OEC) and Multidisciplinary Minor (MDM). 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 course 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 other institutes of repute along with courses like Design Thinking. This will lead to 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. aims to create balance in brain hemispheres and hence improve learners' clarity in thoughts and responses.

In addition, our framework offers Honors/ Honours by Research/ Double Minor (Multidisciplinary Minor and Specialization Minor) degree in each UG programme of engineering. It includes specialized courses along with field/ domain study that make student capable of working on industry relevant problems.

Chairman, Board of Studies   Chairman, Academic Council
Department of Computer Engineering   Vidyalankar Institute of Technology
Vidyalankar Institute of Technology

VERTICAL BASED CREDIT ALLOTMENT

Sr. No.	Verticals	Sub-Verticals	Credits
I	BSC/ ESC (BSES)	Basic Science (BSES_BSC)	15
II		Engineering Science (BSES_ESC)	12
III	Program Courses (PC)	Programme Core Course (PC_PCC)	44
IV		Programme Elective Course (PC_PEC)	20
V	Multidisciplinary Courses (MDC)	Multidisciplinary Minor (MDC_MDM)	14
VI		Open Elective (MDC_OEC)	08
VII	Skill Courses (SC)	Vocational and Skill Enhancement Course (SC_VSEC)	08
VIII	Humanities Social Science and Management (HSSM)	Ability Enhancement Course (HSSM_AEC)	04
IX		Entrepreneurship/ Economics/ Management Course (HSSM_EEMC)	03
X		Indian Knowledge System (HSSM_IKS)	02
XI		Value Education Course (HSSM_VEC)	05
XII	Experiential Learning Courses (ELC)	Research Methodology (ELC_RM)	03
XIII		Comm. Engg. Project (ELC_CEP)/ Field Project (ELC_FP)	02
XIV		Project (ELC_PRJ)	06
XV		Internship/ OJT (ELC_OJT)	12
XVI	Liberal Learning Courses (LLC)	Co-Curricular Courses (LLC_CC)	04
	Total		**162**

Learner is expected to complete requirement of 162 credits (with minimum credits under each vertical and/or bucket as mentioned above) for B.Tech. degree in Computer Engineering with Multidisciplinary Minor.

Additionally, learners can choose to avail i) B.Tech. in Computer Engineering – Honors and Multidisciplinary Minor or ii) B.Tech. in Computer Engineering - Honours with Research and Multidisciplinary Minor or iii) B.Tech. in Computer Engineering with Double Minors (Multidisciplinary and Specialization Minor) Degree by completing requirements of 18 credits, which will be over and above the 162 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. Computer Engineering Programme applicable for R-2024 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 Verticals/ Sub-Verticals

I.   Basic Science Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	BSC01*	Engineering Mathematics-I	3	-	-	3	1
2	BSC03*	Engineering Mathematics-II	3	-	-	3	2
3	BSC05	Engineering Mathematics-III	3	-	-	3	3
4	BSC07	Engineering Mathematics-IV	3	-	-	3	4
5	BSC09T*	Physics	2	-	-	2	2
6	BSC09P*	Physics Lab	-	2	-	1	2

* Courses exempted for Direct Second Year (DSY) students who will secure admission through lateral entry from the A.Y. 2025-26 onwards.

II.   Engineering Science Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	ESC01T*	Engineering Graphics	2	-	-	2	1
2	ESC01P*	Engineering Graphics Lab	-	2	-	1	1
3	ESC04T*	Fundamentals of Computer Hardware and Networking	2	-	-	2	1
4	ESC04P*	Fundamentals of Computer Hardware and Networking Lab	-	2	-	1	1
5	ESC05T*	Fundamental of Logic Circuits	2	-	-	2	1
6	ESC05P*	Fundamental of Logic Circuits Lab	-	2	-	1	1
7	ESC08*	Computer Organization and Architecture	3	-	-	3	2

*Courses exempted for Direct Second Year (DSY) students who will secure admission through lateral entry from the A.Y. 2025-26 onwards.

III.   Programme Core Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	PCCE01T*	Data Structure	2	-	-	2	2
2	PCCE01P*	Data Structure Lab	-	2	-	1	2
3	PCCE02T	Microprocessor	2	-	-	2	3
4	PCCE02P	Microprocessor Lab	-	2	-	1	3
5	PCCE04T	Analysis of Algorithms	2	-	-	2	3

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
6	PCCE04P	Analysis of Algorithms Lab	-	2	-	1	3
7	PCCE05T	Database Management Systems	2	-	-	2	3
8	PCCE05P	Database Management Systems Lab	-	2	-	1	3
9	PCCE06T	Computer Graphics	2	-	-	2	4
10	PCCE06P	Computer Graphics Lab	-	2	-	1	4
11	PCCE07T	Operating Systems	2	-	-	2	4
12	PCCE07P	Operating Systems Lab	-	2	-	1	4
13	PCCE09	Theory of Computer Science	2	-	1	3	5
14	PCCE10T	Artificial Intelligence	2	-	-	2	5
15	PCCE10P	Artificial Intelligence Lab	-	2	-	1	5
16	PCCE11T	Computer Networks	2	-	-	2	5
17	PCCE11P	Computer Networks Lab	-	2	-	1	5
18	PCCE12T	Software Engineering	2	-	-	2	5
19	PCCE12P	Web Design Lab	-	2	-	1	5
20	PCCE13T	Machine Learning	2	-	-	2	6
21	PCCE13P	Machine Learning Lab	-	2	-	1	6
22	PCCE14	Cloud Computing Lab	-	2	-	1	6
23	PCCE15	System Programming and Compiler Design	3	-	-	3	6
24	PCCE16T	Distributed Systems	2	-	-	2	6
25	PCCE16P	Distributed Systems Lab	-	2	-	1	6
26	PCCE17	Programming with R	-	2	-	1	7
27	PCCE18	Machine Vision using Python	-	2	-	1	7
28	PCCE19	DevOps	1	2	-	2	7

*Courses exempted for Direct Second Year (DSY) students who will secure admission through lateral entry from the A.Y. 2025-26 onwards.

IV. Programme Elective Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	PECE01T	Soft Computing	2	-	-	2	6
2	PECE01P	Soft Computing Lab	-	2	-	1	6
3	PECE02T	Data Warehousing and Data Mining	2	-	-	2	5
4	PECE02P	Data Warehousing and Data Mining Lab	-	2	-	1	5
5	PECE03T	Modern Sensors for Internet of Things	2	-	-	2	5

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
6	PECE03P	Modern Sensors for Internet of Things Lab	-	2	-	1	5
7	PECE04T	Computer and Network Security	2	-	-	2	5
8	PECE04P	Computer and Network Security Lab	-	2	-	1	5
9	PECE05T	Natural Language Processing	2	-	-	2	7
10	PECE05P	Natural Language Processing Lab	-	2	-	1	7
11	PECE06T	Advanced Databases	2	-	-	2	6
12	PECE06P	Advanced Databases Lab	-	2	-	1	6
13	PECE07T	Text, Web & Social Media Analytics	2	-	-	2	7
14	PECE07P	Text, Web & Social Media Analytics Lab	-	2	-	1	7
15	PECE08T	System Security and Ethical Hacking	2	-	-	2	6
16	PECE08P	System Security and Ethical Hacking Lab	-	2	-	1	6
17	PECE09T	Advanced Machine Learning	2	-	-	2	7
18	PECE09P	Advanced Machine Learning Lab	-	2	-	1	7
19	PECE10	Probabilistic and Graphical Model	3	-	-	3	6
20	PECE11T	Embedded Systems Design and Tiny OS	2	-	-	2	6
21	PECE11P	Embedded Systems Design and Tiny OS Lab	-	2	-	1	6
22	PECE12T	Web Application Security	2	-	-	2	7
23	PECE12P	Web Application Security Lab	-	2	-	1	7
24	PECE13T	Deep Learning	2	-	-	2	7
25	PECE13P	Deep Learning Lab	-	2	-	1	7
26	PECE14T	Big Data Analytics	2	-	-	2	7
27	PECE14P	Big Data Analytics Lab	-	2	-	1	7
28	PECE15T	Malware Analysis	2	-	-	2	7
29	PECE15P	Malware Analysis Lab	-	2	-	1	7
30	PECE16T	Mobile and Wireless Security	2	-	-	2	7
31	PECE16P	Mobile and Wireless Security Lab	-	2	-	1	7
32	PECE17T	IoT & Edge Computing	2	-	-	2	7

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
33	PECE17P	IoT & Edge Computing Lab	-	2	-	1	7
34	PECE18T	Recommendation System	2	-	-	2	7
35	PECE18P	Recommendation System Lab	-	2	-	1	7
36	PECE19T	IoT Security & Trust	2	-	-	2	7
37	PECE19P	IoT Security & Trust Lab	-	2	-	1	7
38	PECE20T	Industrial IoT	2	-	-	2	7
39	PECE20P	Industrial IoT Lab	-	2	-	1	7
40	PECE21T	Digital Forensic	2	-	-	2	6
41	PECE21P	Digital Forensic Lab	-	2	-	1	6
42	PECE22T	Principles of Internet of Things	2	-	-	2	6
43	PECE22P	Principles of Internet of Things Lab	-	2	-	1	6

V.   Multidisciplinary Minor Courses

Sr. No.	MDM Title	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
				Theory	Practical	Tutorial		
1	For all MDMs	MDM01	Seminar	2	-	-	2	7
2		MDMBI01	Introduction to Bioinformatics	3	-	1	4	3
3	Bioinformatics	MDMBI02	Algorithms and Data Structures in Bioinformatics	3	-	1	4	4
4		MDMBI03	Machine Learning Applications in Bioinformatics	3	-	1	4	5

Sr. No.	MDM Title	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
				Theory	Practical	Tutorial		
5	Innovation, Entrepreneurial and Venture Development	MDMIE01	Foundations of Innovation and Entrepreneurship	3	-	1	4	3
6		MDMIE02	Startup Planning and Development	3	-	1	4	4
7		MDMIE03	Innovation Management and Scaling Startups	3	-	1	4	5
8	Business Development, Marketing and Finance	MDMBD01	Introduction to Business Development and Marketing Principles	3	-	1	4	3
9		MDMBD02	Financial Basics for Engineers and Technopreneurs	3	-	1	4	4
10		MDMBD03	Strategic Marketing and Business Planning	3	-	1	4	5
11	Robotics	MDMRB01	Fundamentals of Robotics and Control	3	2	-	4	3
12		MDMRB02	Machine Vision and Robotic Perception	3	2	-	4	4

Sr. No.	MDM Title	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
				Theory	Practical	Tutorial		
13		MDMRB03	Intelligent Mobile Robotics	3	2	-	4	5
14		MDMCS01	Computational Logic and Data Structures	3	2	-	4	3
15	Computer Science*	MDMCS02	Operating Systems and Computer Networks	3	2	-	4	4
16		MDMCS03	Database Systems and Introduction to Data Mining	3	2	-	4	5

*Computer Science MDM Title is offered by department of Computer Engineering. This MDM title can be selected as Multidisciplinary Minor by learner of UG Engineering Programme at VIT, other than B.Tech. Computer Engineering student.

VI.   Open Elective Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	OEC01*	Collaborative Inter-Institute Studies	As per offering institute			4	SE Summer Break
2	OEC02	Cyber Law	2	-	-	2	7
3	OEC03	Project Management	2	-	-	2	7
4	OEC04	Product Lifecycle Management	2	-	-	2	7
5	OEC05	Sustainability Management	2	-	-	2	8
6	OEC06	Renewable Energy Management	2	-	-	2	8
7	OEC07	Biology	2	-	-	2	3
8	OEC08	Chemistry	2	-	-	2	3
9	OEC09	Psychology	2	-	-	2	Any

*For OEC01- Collaborative Inter-Institute Studies: 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.

VII.   Vocational and Skill Enhancement Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	VSEC01T*	Structured Programming	2	-	-	2	1
2	VSEC01P*	Structured Programming Lab	-	2	-	1	1
3	VSEC02T*	Object Oriented Programming	2	-	-	2	2
4	VSEC02P*	Object Oriented Programming Lab	-	2	-	1	2
5	VSEC03	Python Programming	-	4	-	2	4

***Courses exempted for Direct Second Year (DSY) students who will secure admission through lateral entry from the A.Y. 2025-26 onwards.**

VIII.   Ability Enhancement Courses

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

***Courses exempted for Direct Second Year (DSY) students who will secure admission through lateral entry from the A.Y. 2025-26 onwards.**

IX.   Entrepreneurship/ Economics/ Management Courses

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

X.   Indian Knowledge System Courses

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

*Courses exempted for Direct Second Year (DSY) students who will secure admission through lateral entry from the A.Y. 2025-26 onwards.

XI. Value Education Courses

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

XII. Research Methodology Courses

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

XIII. Community Engagement Project/ Field Project

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	CEP01*	Social Service Internship/ Project	-	4	-	2	4

*For CEP01- Social Service Internship/ Project: 1 hour / week slot will be provided during the semester (in regular timetable). Additional work of 45 hours needs to be completed during the semester (besides regular timetable).

XIV. Project

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	PRJCE01	Specialization-Based Project		4		2	6
2	PRJCE02	Project-1 (Synopsis)	2	-	-	2	6
3	PRJCE03	Project-2 (Final)	-	8	-	4	7

XV. Internship/ On Job Training (OJT)

Sr. No.	Course Code	Course Name	Total Hours			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	OJT01	Industry Internship 1	-	150	-	5	TE Summer Break
2	OJT02	Industry Internship 2	-	210	-	7	8

XVI. Liberal Learning/ Co-curricular Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	CC01	Various Dance Forms	2	-	-	2	Any
2	CC02	Corporate and Social Etiquettes	2	-	-	2	Any
3	CC03	Global Citizenship Education	2	-	-	2	Any
4	CC04	Wellness – Body, Mind & Spirit	2	-	-	2	Any
5	CC05	IQ vs EQ	2	-	-	2	Any
6	CC06	Nutrition and Physical Wellness	2	-	-	2	Any
7	CC07	Facets of Astronomy	2	-	-	2	Any
8	CC08	Railways - Wonders of Infrastructure	2	-	-	2	Any
9	CC09	Financial Literacy for Engineers	2	-	-	2	Any
10	CC10	Mastering Advanced Excel	2	-	-	2	Any
11	CC11	Personal Grooming Essentials	2	-	-	2	Any
12	CC12	Various Music Forms	2	-	-	2	Any

Illustrative Semester wise

Credit Distribution Structure and Assessment Guidelines
(Based on NEP 2020 Guidelines)

for

Bachelor of Technology

in

Computer Engineering with Multidisciplinary Minor

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

Vertical_ Subvertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
BSES_BSC	BSC01	Engineering Mathematics-I	Theory	3	20	30	50	100
BSES_ESC	ESC01T	Engineering Graphics	Theory	2	15	20	40	075
BSES_ESC	ESC01P	Engineering Graphics Lab	Practical	1	25	-	25	050
BSES_ESC	ESC04T	Fundamentals of Computer Hardware and Networking	Theory	2	15	20	40	075
BSES_ESC	ESC04P	Fundamentals of Computer Hardware and Networking Lab	Practical	1	25	-	25	050
BSES_ESC	ESC05T	Fundamental of Logic Circuits	Theory	2	15	20	40	075
BSES_ESC	ESC05P	Fundamental of Logic Circuits Lab	Practical	1	25	-	25	050
SC_VSEC	VSEC01T	Structured Programming	Theory	2	15	20	40	075
SC_VSEC	VSEC01P	Structured Programming Lab	Practical	1	25	-	25	050
HSSM_AEC	AEC01T	Effective Communication	Theory	2	15	20	40	075
HSSM_AEC	AEC01P	Effective Communication Lab	Practical	1	25	-	25	050
LLC_CC	CCXX*	Any LLC_CC course offered	Theory	2	As per list below			
Total Credits				**20**				

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

List of Liberal Learning_ Cocurricular Courses

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
CC01	Various Dance Forms	Theory	2	25	-	50	075
CC02	Corporate and Social Etiquettes	Theory	2	25	-	50	075
CC03	Global Citizenship Education	Theory	2	25	-	50	075
CC04	Wellness – Body, Mind & Spirit	Theory	2	25	-	50	075
CC05	IQ vs EQ	Theory	2	25	-	50	075
CC06	Nutrition and Physical Wellness	Theory	2	25	-	50	075
CC07	Facets of Astronomy	Theory	2	25	-	50	075
CC08	Railways - Wonders of Infrastructure	Theory	2	25	-	50	075
CC09	Financial Literacy for Engineers	Theory	2	25	-	50	075
CC10	Mastering Advanced Excel	Theory	2	25	-	50	075
CC11	Personal Grooming Essentials	Theory	2	25	-	50	075
CC12	Various Music Forms	Theory	2	25	-	50	075

First Year B. Tech. Computer Engineering   **Preferred Semester: II**

Course Structure and Assessment Guidelines

Vertical_ Subvertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
BSES_BSC	BSC03	Engineering Mathematics-II	Theory	3	20	30	50	100
BSES_BSC	BSC09T	Physics	Theory	2	15	20	40	075
BSES_BSC	BSC09P	Physics Lab	Practical	1	25	-	25	050
BSES_ESC	ESC08	Computer Organization and Architecture	Theory	3	20	30	50	100
PC_PCC	PCCE01T	Data Structure	Theory	2	15	20	40	075
PC_PCC	PCCE01P	Data Structure Lab	Practical	1	25	-	25	050
SC_VSEC	VSEC02T	Object-Oriented Programming	Theory	2	15	20	40	075
SC_VSEC	VSEC02P	Object-Oriented Programming Lab	Practical	1	25	-	25	050
HSSM_IKS	IKSXX*	Any HSSM_IKS course	Theory	2	As per list below			
LLC_CC	CCXX*	Any LLC_CC course offered	Theory	2	As per list below			
Total Credits				**19**				

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

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.

List of Indian Knowledge System Courses

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
IKS01	Indian Traditional Knowledge System	Theory	2	25	-	50	075
IKS02	Indian Constitution	Theory	2	25	-	50	075
IKS03	Exploring Indian Art	Theory	2	25	-	50	075

List of Liberal Learning_ Cocurricular Courses

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
CC01	Various Dance Forms	Theory	2	25	-	50	075
CC02	Corporate and Social Etiquettes	Theory	2	25	-	50	075
CC03	Global Citizenship Education	Theory	2	25	-	50	075
CC04	Wellness – Body, Mind & Spirit	Theory	2	25	-	50	075
CC05	IQ vs EQ	Theory	2	25	-	50	075
CC06	Nutrition and Physical Wellness	Theory	2	25	-	50	075
CC07	Facets of Astronomy	Theory	2	25	-	50	075
CC08	Railways - Wonders of Infrastructure	Theory	2	25	-	50	075
CC09	Financial Literacy for Engineers	Theory	2	25	-	50	075
CC10	Mastering Advanced Excel	Theory	2	25	-	50	075
CC11	Personal Grooming Essentials	Theory	2	25	-	50	075
CC12	Various Music Forms	Theory	2	25	-	50	075

Second Year B. Tech. Computer Engineering **Preferred Semester: III**
Course Structure and Assessment Guidelines

Vertical_ Subvertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
BSES_BSC	BSC05	Engineering Mathematics-III	Theory	3	20	30	50	100
PC_PCC	PCCE02T	Microprocessor	Theory	2	15	20	40	075
PC_PCC	PCCE02P	Microprocessor Lab	Practical	1	25	-	25	050
PC_PCC	PCCE04T	Analysis of Algorithms	Theory	2	15	20	40	075
PC_PCC	PCCE04P	Analysis of Algorithms Lab	Practical	1	25	-	25	050
PC_PCC	PCCE05T	Database Management Systems	Theory	2	15	20	40	075
PC_PCC	PCCE05P	Database Management Systems Lab	Practical	1	25	-	25	050
MDC_MDM	MDMXX#	MDM Course1 of chosen Title	As per list below	4	45	30	50	125
HSSM_EEMC	EEMC01	Design Thinking	Theory + Practical	3	50	-	50	100
HSSM_AEC	AEC03	Presentation Skills	Practical	1	50	-	-	050
Total Credits				**20**				

*Selection based on the subset of courses made available by the Institute for the semester.
#Selection based on the MD M Title chosen by the student.
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.

Guidelines for Multidisciplinary Elective Courses and Minor Degree – Refer Appendix-B

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 MD M Title are given in Appendix-B.

Multidisciplinary Elective Course1 (MDMXX)

MDM Title	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
Bioinformatics	MDMBI01	Introduction to Bioinformatics	Theory+ Tutorial	4	45	30	50	125
Innovation, Entrepreneurial and Venture Development	MDMIE01	Foundations of Innovation and Entrepreneurship	Theory+ Tutorial	4	45	30	50	125
Business Development, Marketing and Finance	MDMBD01	Introduction to Business Development and Marketing Principles	Theory+ Tutorial	4	45	30	50	125
Robotics	MDMRB01	Fundamentals of Robotics and Control	Theory+ Practical	4	45	30	50	125

Second Year B. Tech. Computer Engineering   **Preferred Semester: IV**
Course Structure and Assessment Guidelines

Vertical_ Subvertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
BSES_BSC	BSC07	Engineering Mathematics-IV	Theory	3	20	30	50	100
PC_PCC	PCCE06T	Computer Graphics	Theory	2	15	20	40	075
PC_PCC	PCCE06P	Computer Graphics Lab	Practical	1	25	-	25	050
PC_PCC	PCCE07T	Operating Systems	Theory	2	15	20	40	075
PC_PCC	PCCE07P	Operating Systems Lab	Practical	1	25	-	25	050
SC_VSEC	VSEC03	Python Programming	Practical	2	50	-	25	075
HSSM_VEC	VEC01T	Professional Skills	Theory	2	15	20	40	075
HSSM_VEC	VEC01P	Professional Skills Lab	Practical	1	25	-	25	050
ELC_CEP	CEP01*	Social Service Internship/ Project	Practical	2	25	-	50	075
MDC_MDM	MDMXX#	MDM Course2 of chosen Title	As per list below	4	45	30	50	125
Total Credits				**20**				

*For CEP01- Social Service Internship/ Project:** 1 hour / week slot will be provided during the semester (in regular timetable). Additional work of 45 hours needs to be completed during the semester (besides regular timetable).

#Selection based on the MDM Title chosen by the student.

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.

Multidisciplinary Elective Course2 (MDMXX)

MDM Title	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
Bioinformatics	MDMBI02	Algorithms and Data Structures in Bioinformatics	Theory+ Tutorial	4	45	30	50	125
Innovation, Entrepreneurial and Venture Development	MDMIE02	Startup Planning and Development	Theory+ Tutorial	4	45	30	50	125
Business Development, Marketing and Finance	MDMBD02	Financial Basics for Engineers and Technopreneurs	Theory+ Tutorial	4	45	30	50	125
Robotics	MDMRB02	Machine Vision and Robotic Perception	Theory+ Practical	4	45	30	50	125

Second Year B. Tech. Computer Engineering - Summer Break

Vertical_ Subvertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
MDC_OE	OEC01*	Collaborative Inter-Institute Studies	As per course	4	125	-	-	125
Total Credits				**04**				

*For OEC01- Collaborative Inter-Institute Studies:** 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. Computer Engineering   **Preferred Semester: V**
Course Structure and Assessment Guidelines

Vertical_ Subvertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
PC_PCC	PCCE09	Theory of Computer Science	Theory+ Tutorial	3	40	20	40	100
PC_PCC	PCCE11T	Computer Networks	Theory	2	15	20	40	075
PC_PCC	PCCE11P	Computer Networks Lab	Practical	1	25	-	25	050
PC_PCC	PCCE10T	Artificial Intelligence	Theory	2	15	20	40	075
PC_PCC	PCCE10P	Artificial Intelligence Lab	Practical	1	25	-	25	050
PC_PCC	PCCE12T	Software Engineering	Theory	2	15	20	40	075
PC_PCC	PCCE12P	Web Design Lab	Practical	1	25	-	25	050
MDC_MDM	MDMXX#	MDM Course3 of chosen Title	As per list below	4	45	30	50	125
HSSM_VEC	VECXX*	Any HSSM_VEC course	Theory	2	As per list below			
PC_PEC	PECEXX*	Programme Elective-1	As per list below	3	As per list below			
Total Credits				**21**				
Course credits completed during the previous inter-semester break will appear in this semester's marksheet								
MDC_OE	OEC01	Collaborative Inter-Institute Studies	As per offering institute	4	125	-	-	125

*Selection based on the subset of courses made available by the Institute for the semester.
#Selection based on the MDM Title chosen by the student.
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.

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

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

Programme Elective-1 Courses (PECEXXT and PECEXXP)

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)	PECE02T	Data Warehousing and Data Mining	Theory	2	15	20	40	075
	PECE02P	Data Warehousing and Data Mining Lab	Practical	1	25	-	25	050
Data Science (DS)	PECE02T	Data Warehousing and Data Mining	Theory	2	15	20	40	075
	PECE02P	Data Warehousing and Data Mining Lab	Practical	1	25	-	25	050
Internet of Things (IoT)	PECE03T	Modern Sensors for Internet of Things	Theory	2	15	20	40	075
	PECE03P	Modern Sensors for Internet of Things lab	Practical	1	25	-	25	050
Computer Security (CSec)	PECE04T	Computer and Network Security	Theory	2	15	20	40	075
	PECE04P	Computer and Network Security Lab	Practical	1	25	-	25	050

#For details of Specialization Certificate, refer Appendix-A

List of Value Education Courses (VECXX)

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
VEC02	E-waste and Environmental Management	Theory	2	15	20	40	075
VEC03	Universal Human Values	Theory	2	25	-	50	075
VEC04	Responsibility Towards Sustainable Environment	Theory	2	25	-	50	075
VEC05	Four Pillars of Democratic Nation	Theory	2	25	-	50	075

Multidisciplinary Elective Course3 (MDMXX)

MDM Title	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
Bioinformatics	MDMBI03	Machine Learning Applications in Bioinformatics	Theory+ Tutorial	4	45	30	50	125
Innovation, Entrepreneurial and Venture Development	MDMIE03	Innovation Management and Scaling Startups	Theory+ Tutorial	4	45	30	50	125
Business Development, Marketing and Finance	MDMBD03	Strategic Marketing and Business Planning	Theory+ Tutorial	4	45	30	50	125
Robotics	MDMRB03	Intelligent Mobile Robotics	Theory+ Practical	4	45	30	50	125

Guidelines for Award of Honours/ Honours by Research / Double Minor (Multidisciplinary and Specialization) Degree

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

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

Vertical_ Subvertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
PC_PCC	PCCE14	Cloud Computing Lab	Practical	1	25	-	25	050
PC_PCC	PCCE15	System Programming and Compiler Design	Theory	3	20	30	50	100
PC_PCC	PCCE16T	Distributed Systems	Theory	2	15	20	40	075
PC_PCC	PCCE16P	Distributed Systems Lab	Practical	1	25	-	25	050
PC_PCC	PCCE13T	Machine Learning	Theory	2	15	20	40	075
PC_PCC	PCCE13P	Machine Learning Lab	Practical	1	25	-	25	050
PC_PEC	PECEXX*	Programme Elective-2	As per list below	3	As per list below			
PC_PEC	PECEXX*	Programme Elective-3	As per list below	3	As per list below			
PC_PEC	PRJCE01	Specialization-Based Project	Practical	2	25	-	50	075
ELC_PRJ	PRJCE02	Project-1 (Synopsis)	Theory	2	50	-	25	075
Total Credits				**20**				

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

Programme Elective-2 Courses (PECEXXT and PECEXXP)

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)	PECE01T	Soft Computing	Theory	2	15	20	40	075
	PECE01P	Soft Computing Lab	Practical	1	25	-	25	050
Data Science (DS)	PECE06T	Advanced Databases	Theory	2	15	20	40	075
	PECE06P	Advanced Databases Lab	Practical	1	25	-	25	050
Internet of Things (IoT)	PECE11T	Embedded Systems Design and Tiny OS	Theory	2	15	20	40	075
	PECE11P	Embedded Systems Design and Tiny OS Lab	Practical	1	25	-	25	050
Computer Security (CSec)	PECE08T	System Security and Ethical Hacking	Theory	2	15	20	40	075
	PECE08P	System Security and Ethical Hacking Lab	Practical	1	25	-	25	050

#For details of Specialization Certificate, refer Appendix-A

Programme Elective-3 Courses (PECEXXT and PECEXXP)

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)	PECE10	Probabilistic and Graphical Model	Theory + Tutorial	3	40	20	40	100
Data Science (DS)	PECE10	Probabilistic and Graphical Model	Theory + Tutorial	3	40	20	40	100
Internet of Things (IoT)	PECE22T	Principles of Internet of Things	Theory	2	15	20	40	075

Specialization Track Name#	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
	PECE22P	Principles of Internet of Things Lab	Practical	1	25	-	25	050
Computer Security (CSec)	PECE21T	Digital Forensics	Theory	2	15	20	40	075
	PECE21P	Digital Forensics Lab	Practical	1	25	-	25	050

#For details of Specialization Certificate, refer Appendix-A

Third Year B. Tech. Computer Engineering - Summer Break

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
OJT01	Industry Internship 1	Internship	5	75	-	75	150
Total Credits			**05**				

*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. Computer Engineering　　　　　　　　**Preferred Semester: VII**
Course Structure and Assessment Guidelines

Vertical_ Subvertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
PC_PCC	PCCE18	Machine Vision using Python	Practical	1	25	-	25	050
PC_PCC	PCCE17	Programming with R	Practical	1	25	-	25	050
PC_PCC	PCCE19	DevOps	Theory + Practical	2	50	-	25	075
PC_PEC	PECEXX*	Programme Elective-4	As per list below	3	As per list below			
PC_PEC	PECEXX*	Programme Elective-5	As per list below	3	As per list below			
PC_PEC	PECEXX*	Programme Elective-6	As per list below	3	As per list below			
ELC_PRJ	PRJCE03	Project-2 (Final)	Practical	4	75	-	50	125
MDC_MDM	MDM01#	Seminar	Theory	2	25	-	50	075
Total Credits				**19**				
Course credits completed during the previous inter-semester break will appear in this semester's marksheet								
ELC_OJT	OJT01	Industry Internship 1	Internship	5	75	-	75	150

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

#Seminar based on the MD M Title chosen by the student.

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.

Programme Elective-4 Courses (PECEXXT and PECEXXP)

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)	PECE05T	Natural language processing	Theory	2	15	20	40	075
	PECE05P	Natural language processing Lab	Practical	1	25	-	25	050
Data Science (DS)	PECE07T	Text, Web & Social Media Analytics	Theory	2	15	20	40	075
	PECE07P	Text, Web & Social Media Analytics Lab	Practical	1	25	-	25	050
Internet of Things (IoT)	PECE17T	IoT & Edge Computing	Theory	2	15	20	40	075
	PECE17P	IoT & Edge Computing Lab	Practical	1	25	-	25	050
Computer Security (CSec)	PECE12T	Web Application Security	Theory	2	15	20	40	075
	PECE12P	Web Application Security Lab	Practical	1	25	-	25	050

#For details of Specialization Certificate, refer Appendix-A

Programme Elective-5 Courses (PECEXXT and PECEXXP)

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)	PECE09T	Advance Machine Learning	Theory	2	15	20	40	075
	PECE09P	Advance Machine Learning Lab	Practical	1	25	-	25	050
Data Science (DS)	PECE14T	Big Data Analytics	Theory	2	15	20	40	075
	PECE14P	Big Data Analytics Lab	Practical	1	25	-	25	050
Internet of Things (IoT)	PECE19T	IoT Security & Trust	Theory	2	15	20	40	075

Specialization Track Name#	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
	PECE19P	IoT Security & Trust Lab	Practical	1	25	-	25	050
Computer Security (CSec)	PECE15T	Malware Analysis	Theory	2	15	20	40	075
	PECE15P	Malware Analysis Lab	Practical	1	25	-	25	050

#For details of Specialization Certificate, refer Appendix-A

Programme Elective-6 Courses (PECEXXT and PECEXXP)

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)	PECE13T	Deep learning	Theory	2	15	20	40	075
	PECE13P	Deep learning Lab	Practical	1	25	-	25	050
Data Science (DS)	PECE18T	Recommendation System	Theory	2	15	20	40	075
	PECE18P	Recommendation System Lab	Practical	1	25	-	25	050
Internet of Things (IoT)	PECE20T	Industrial IoT	Theory	2	15	20	40	075
	PECE20P	Industrial IoT Lab	Practical	1	25	-	25	050
Computer Security (CSec)	PECE16T	Mobile and Wireless Security	Theory	2	15	20	40	075
	PECE16P	Mobile and Wireless Security Lab	Practical	1	25	-	25	050

#For details of Specialization Certificate, refer Appendix-A

Final Year B. Tech. Computer Engineering   **Preferred Semester: VIII**
Course Structure and Assessment Guidelines

Vertical_ Subvertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
ELC_OJT	OJT02	Industry Internship 2	Internship	7	100	-	100	200
ELC_RM	RM01	Research Methodology	Theory	3	20	30	50	100
MDC_OE	OECXX*	Any 2 Open Elective courses	Theory	2+2	As per list below			
Total Credits				**14**				

*Selection based on the subset of courses made available by the Institute for the semester.
#Seminar based on the MD M Title chosen by the student.
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.

List of Open Elective Courses (OECXX)

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
OEC02	Cyber Law	Theory	2	15	20	40	075
OEC03	Project Management	Theory	2	15	20	40	075
OEC04	Product Lifecycle Management	Theory	2	15	20	40	075
OEC05	Sustainability Management	Theory	2	15	20	40	075
OEC06	Renewable Energy Management	Theory	2	15	20	40	075

Appendix-A

Guidelines for Programme Elective Courses and Specialization Certificate

Programme Elective courses are designed to meet industrial requirements. All learners must opt for 6 Programme Elective courses (both Theory and Practical component) as a part of 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. Computer Security (CSec)

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

Learners who choose Programme Elective courses from different specialisation tracks will not be eligible for a Specialization Certificate.

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

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

Semester	Course Code	Course Name
V	PECE02T	Data Warehousing and Data Mining
V	PECE02P	Data Warehousing and Data Mining Lab
VI	PECE01T	Soft Computing
VI	PECE01P	Soft Computing Lab
VI	PECE10	Probabilistic and Graphical Model
VII	PECE05T	Natural language processing
VII	PECE05P	Natural language processing Lab
VII	PECE09T	Advance Machine Learning
VII	PECE09P	Advance Machine Learning Lab
VII	PECE13T	Deep learning
VII	PECE13P	Deep learning Lab

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

Semester	Course Code	Course Name
V	PECE02T	Data Warehousing and Data Mining
V	PECE02P	Data Warehousing and Data Mining Lab
VI	PECE06T	Advanced Databases
VI	PECE06P	Advanced Databases Lab
VI	PECE10	Probabilistic and Graphical Model
VII	PECE07T	Text, Web & Social Media Analytics
VII	PECE07P	Text, Web & Social Media Analytics Lab
VII	PECE14T	Big Data Analytics

Semester	Course Code	Course Name
VII	PECE14P	Big Data Analytics Lab
VII	PECE18T	Recommendation System
VII	PECE18P	Recommendation System Lab

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

Semester	Course Code	Course Name
V	PECE03T	Modern Sensors for Internet of Things
V	PECE03P	Modern Sensors for Internet of Things Lab
VI	PECE11T	Embedded Systems Design and Tiny OS
VI	PECE11P	Embedded Systems Design and Tiny OS Lab
VI	PECE22T	Principles of Internet of Things
VI	PECE22P	Principles of Internet of Things Lab
VII	PECE17T	IoT & Edge Computing
VII	PECE17P	IoT & Edge Computing Lab
VII	PECE19T	IoT Security & Trust
VII	PECE19P	IoT Security & Trust Lab
VII	PECE20T	Industrial IoT
VII	PECE20P	Industrial IoT Lab

CSec track: Courses to be chosen for specialization in Computer Security

Semester	Course Code	Course Name
V	PECE04T	Computer and Network Security
V	PECE04P	Computer and Network Security Lab
VI	PECE08T	System Security and Ethical Hacking
VI	PECE08P	System Security and Ethical Hacking Lab
VI	PECE21T	Digital Forensics
VI	PECE21P	Digital Forensics Lab
VII	PECE12T	Web Application Security
VII	PECE12P	Web Application Security Lab
VII	PECE15T	Malware Analysis
VII	PECE15P	Malware Analysis Lab
VII	PECE16T	Mobile and Wireless Security
VII	PECE16P	Mobile and Wireless Security Lab

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.

Department of Computer Engineering offers the following Multidisciplinary Minor Degree Titles for B.Tech. Computer 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 (MDM) Degree Programme as a part of B.Tech. Computer Engineering degree.

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

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

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

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

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

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

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

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