



# Vidyalankar Institute of Technology

An Autonomous Institute affiliated to University of Mumbai

## Bachelor of Technology

in

## Computer Engineering

### R-2024 Programme Structure

(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 is comfortable with and this enables life long 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 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 Professional 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 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 institutes abroad 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.

## Programme Structure (2024) for Bachelor of Technology (B.Tech.) – Computer Engineering

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 student capable of working on industry relevant problems.

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

Chairman, Academic Council  
Vidyalankar Institute of Technology

**VERTICAL BASED CREDIT ALLOTMENT**

Sr. No.	Verticals	Baskets	Credits
I	BSC/ ESC	Basic Science (BS)	15
II		Engineering Science (ES)	12
III	Program Courses	Programme Core Course (PCC)	45
IV		Programme Elective Course (PEC)	18
V	Multidisciplinary Courses	Multidisciplinary Minor (MDM)	14
VI		Open Elective (OE)	08
VII	Skill Courses	Vocational and Skill Enhancement Course (VSEC)	08
VIII	Humanities Social Science and Management (HSSM)	Ability Enhancement Course (AEC)	04
IX		Entrepreneurship/ Economics/ Management Course (EEMC)	03
X		Indian Knowledge System (IKS)	02
XI		Value Education Course (VEC)	05
XII	Experiential Learning Courses	Research Methodology (RM)	03
XIII		Comm. Engg. Project (CEP)/ Field Project (FP)	03
XIV		Project	06
XV		Internship/ OJT	12
XVI	Liberal Learning Courses	Co-Curricular Courses (CC)	04
<b>Total</b>			<b>162</b>

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.

**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**

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	BS01*	Engineering Mathematics-I	3	-	-	3	1
2	BS14T*	Physics	2	-	-	2	2
3	BS14P*	Physics Lab	-	2	-	1	2
4	BS03*	Engineering Mathematics-II	3	-	-	3	2
5	BS41	Engineering Mathematics-III	3	-	-	3	3
6	BS42	Engineering Mathematics-IV	3	-	-	3	4

**\* 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**

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	ES06T*	Fundamentals of Computer Hardware and Networking	2	-	-	2	1
4	ES06P*	Fundamentals of Computer Hardware and Networking Lab	-	2	-	1	1
5	ES07T*	Fundamentals of Logic Circuits	2	-	-	2	1
6	ES07P*	Fundamentals of Logic Circuits Lab	-	2	-	1	1
7	ES10*	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. 2024-25 onwards.**

**III. Programme Core Courses**

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	CE01T*	Data Structure	2	-	-	2	2
2	CE01P*	Data Structure Lab	-	2	-	1	2
3	CE02T	Microprocessor	2	-	-	2	3
4	CE02P	Microprocessor Lab	-	2	-	1	3

Programme Structure (2024) for Bachelor of Technology (B.Tech.) – Computer Engineering

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
5	CE04T	Analysis of Algorithms	2	-	-	2	3
6	CE04P	Analysis of Algorithms Lab	-	2	-	1	3
7	CE05T	Database Management Systems	2	-	-	2	3
8	CE05P	Database Management Systems Lab	-	2	-	1	3
9	CE06T	Computer Graphics	2	-	-	2	4
10	CE06P	Computer Graphics Lab	-	2	-	1	4
11	CE07T	Operating Systems	2	-	-	2	4
12	CE07P	Operating Systems Lab	-	2	-	1	4
13	CE09	Theory of Computational Science	2	-	1	3	4
14	CE10T	Artificial Intelligence	2	-	-	2	5
15	CE10P	Artificial Intelligence Lab	-	2	-	1	5
16	CE11T	Computer Networks	2	-	-	2	4
17	CE11P	Computer Networks Lab	-	2	-	1	4
18	CE12T	Software Engineering	2	-	-	2	5
19	CE12P	Web Design Lab	-	2	-	1	5
20	CE13T	Machine Learning	2	-	-	2	6
21	CE13P	Machine Learning Lab	-	2	-	1	6
22	CE14	Cloud Computing Lab	-	2	-	1	6
23	CE15	System Programming and Compiler Design	3	-	-	3	5
24	CE16T	Distributed Systems	2	-	-	2	5
25	CE16P	Distributed Systems Lab	-	2	-	1	5
26	CE17	Programming with R	-	2	-	1	7
27	CE43	DevOps	-	4	-	2	7
28	CE44	Machine Vision using Python	-	4	-	2	6

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

**IV. Programme Elective Courses**

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	CE21T	Soft Computing	2	-	-	2	6
2	CE21P	Soft Computing Lab	-	2	-	1	6
3	CE22T	Data warehousing and Data Mining	2	-	-	2	5
4	CE22P	Data warehousing and Data Mining Lab	-	2	-	1	5

Programme Structure (2024) for Bachelor of Technology (B.Tech.) – Computer Engineering

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
5	CE23T	Modern Sensors for Internet of Things	2	-	-	2	5
6	CE23P	Modern Sensors for Internet of Things Lab	-	2	-	1	5
7	CE24T	Cryptography and Network Security	2	-	-	2	5
8	CE24P	Cryptography Lab and Network Security Lab	-	2	-	1	5
9	CE25T	Natural language processing	2	-	-	2	7
10	CE25P	Natural language processing Lab	-	2	-	1	7
11	CE26T	Advance Databases	2	-	-	2	6
12	CE26P	Advance Databases Lab	-	2	-	1	6
13	CE27T	Text, Web & Social Media Analytics	2	-	-	2	7
14	CE27P	Text, Web & Social Media Analytics Lab	-	2	-	1	7
15	CE28T	System Security and Ethical Hacking	2	-	-	2	6
16	CE28P	System Security and Ethical Hacking Lab	-	2	-	1	6
17	CE29T	Advance Machine Learning	2	-	-	2	7
18	CE29P	Advance Machine Learning Lab	-	2	-	1	7
19	CE30	Probabilistic and Graphical Model	3	-	-	3	6
20	CE31T	Embedded Systems Design and Tiny OS	2	-	-	2	6
21	CE31P	Embedded Systems Design and Tiny OS Lab	-	2	-	1	6
22	CE32T	Web Application Security	2	-	-	2	7
23	CE32P	Web Application Security Lab	-	2	-	1	7
24	CE33T	Deep learning	2	-	-	2	7
25	CE33P	Deep learning Lab	-	2	-	1	7
26	CE34T	Big Data Analytics	2	-	-	2	7
27	CE34P	Big Data Analytics Lab	-	2	-	1	7
28	CE35T	Malware Analysis	2	-	-	2	7
29	CE35P	Malware Analysis Lab	-	2	-	1	7
30	CE36T	Mobile and Wireless Security	2	-	-	2	7



Programme Structure (2024) for Bachelor of Technology (B.Tech.) – Computer Engineering

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
31	CE36P	Mobile and Wireless Security Lab	-	2	-	1	7
32	CE37T	IoT & Edge Computing	2	-	-	2	7
33	CE37P	IoT & Edge Computing Lab	-	2	-	1	7
34	CE38T	Recommendation System	2	-	-	2	7
35	CE38P	Recommendation System Lab	-	2	-	1	7
36	CE39T	IoT Security & Trust	2	-	-	2	7
37	CE39P	IoT Security & Trust Lab	-	2	-	1	7
38	CE40T	Industrial IoT	2	-	-	2	7
39	CE40P	Industrial IoT Lab	-	2	-	1	7
40	CE41T	Digital Forensic	2	-	-	2	6
41	CE41P	Digital Forensic Lab	-	2	-	1	6
42	CE42T	Principles of Internet of Things	2	-	-	2	6
43	CE42P	Principles of Internet of Things Lab	-	2	-	1	6

**V. Multidisciplinary Minor Courses**

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	OE22	Project Management	3	-	-	3	6
2	OE23	Product Lifecycle Management	3	-	-	3	5
3	OE24	Sustainability Management	3	-	-	3	7
4	GEF01	Basics of Finance & Legal aspects for Business	2	-	-	2	Any
5	GEF02	Financial Management for beginners	2	-	-	2	Any
6	GECI02	Innovation and Entrepreneurship	1	-	-	1	Any
7	GE01\$	Internship with other Institutes (Credit Transfer)	Minimum 120 hours	4	SE 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).

### VI. Open Elective Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	BS17	Biology	2	-	-	2	3
2	BS19	Chemistry	2	-	-	2	3
3	GESB07	Psychology	2	-	-	2	Any
4	GENS02	Modern Farming	2	-	-	2	Any
5	OE21	Cyber Law	3	-	-	3	8
6	OE25	Operation Research	3	-	-	3	8
7	OE26	IPR and Patenting	2	-	-	2	8
8	OE28	Renewable Energy Management	3	-	-	3	8
9	OE29	Energy Audit and Management	3	-	-	3	8
10	OE30	Bioinformatics	3	-	-	3	8
11	OE31	Nanotechnology	3	-	-	3	8

### VII. Vocational and Skill Enhancement Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	ES04T	Structured Programming	2	-	-	2	1
2	ES04P	Structured Programming Lab	-	2	-	1	1
3	ES05T	Object Oriented Programming	2	-	-	2	2
4	ES05P	Object Oriented Programming Lab	-	2	-	1	2
5	ES11	Python Programming	-	4	-	2	4

### VIII. Ability Enhancement Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	HS01T	Effective Communication	2	-	-	2	Any
2	HS01P	Effective Communication Lab	-	2	-	1	Any
3	HS03	Technical and Business Writing	1	2	-	2	Any
4	HS04	Presentation Skills	-	2	-	1	3
5	GEA01	Voice Culture for Professional Speaking	2	-	-	2	Any
6	GESB04	Corporate and Social Etiquettes	2	-	-	2	Any

**IX. Entrepreneurship/ Economics/ Management Courses**

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	HS06	Principles of Economics and Management	2	-	1	3	Any
2	GECI01	Design Thinking	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	GEA03	Exploring Indian Art	2	-	-	2	Any
2	GESB03	Indian Traditional Knowledge System	2	-	-	2	Any
3	GEPS01	Indian Constitution	2	-	-	2	Any

**XI. Value Education Courses**

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	HS05	E-Waste and Environmental Management	2	-	-	2	Any
2	HS02T	Professional Skills	2	-	-	2	Any
3	HS02P	Professional Skills Lab	-	2	-	1	Any
4	GESB02	Universal Human Values	2	-	-	2	Any
5	GESB06	Responsibility towards sustainable environment	2	-	-	2	Any
6	GEPS02	Four Pillars of Democratic Nation	2	-	-	2	Any
7	GEWI01	Railways - Wonders of Infrastructure	2	-	-	2	Any

**XII. Research Methodology Courses**

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	OE37	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	GESB01#	Social Service Internship/ Project	-	3	-	3	3

# 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).

**XIV. Project**

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	CE48	Project-2 (Final)	1	6	-	4	7
2	CE49	Publication	2	-	-	2	7

**XV. Internship/ On Job Training (OJT)**

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	CE45	Mini Project	-	4	-	2	5
2	CE46	Industry Internship	-	210(total)	-	7	8
3	CE47	Project-1 (Synopsis)	3	-	-	3	6

**XVI. Liberal Learning/ Co-curricular Courses**

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	GEA02	Various Dance Forms	2	-	-	2	Any
2	GESB05	Global Citizenship Education	2	-	-	2	Any
3	GEPEW01	Wellness – Body, Mind & Spirit	2	-	-	2	Any
4	GEPEW02	IQ vs EQ	2	-	-	2	Any
5	GEPEW03	Nutrition and Physical Wellness	2	-	-	2	Any
6	GENS01	Facets of Astronomy	2	-	-	2	Any

Illustrative Semester wise  
Credit Distribution Structure and Assessment Guidelines  
(Based on NEP 2020 Guidelines)  
for  
Bachelor of Technology  
in  
Computer Engineering-One Major, One Minor

**First Year B. Tech. Computer Engineering**  
**Course Structure and Assessment Guidelines**

**Preferred Semester: I**

NEP- Vertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
BSC	BS01	Engineering Mathematics-I	Theory	3	20	30	50	100
ESC	ES01T	Engineering Graphics	Theory	2	15	20	40	075
ESC	ES01P	Engineering Graphics Lab	Practical	1	25	-	25	050
ESC	ES06T	Fundamentals of Computer Hardware and Networking	Theory	2	15	20	40	075
ESC	ES06P	Fundamentals of Computer Hardware and Networking Lab	Lab	1	25	-	25	050
ESC	ES07T	Fundamental of Logic Circuits	Theory	2	15	20	40	075
ESC	ES07P	Fundamental of Logic Circuits Lab	Lab	1	25	-	25	050
SC_VSEC	ES04T	Structured Programming	Theory	2	15	20	40	075
SC_VSEC	ES04P	Structured Programming Lab	Lab	1	25	-	25	050
HSSM_AEC	HSXXT*	Any HSSM_AEC course offered	Theory	2	15	20	40	075
HSSM_AEC	HSXXP*		Practical	1	25	-	25	050
LLC_CC	GEXX*	Any LLC_CC course offered	Theory	2	25	-	50	075
<b>Total Credits</b>				<b>20</b>				

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

\* Selection based on the subset of 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.

**First Year B. Tech. Computer Engineering**

**Preferred Semester: II**

**Course Structure and Assessment Guidelines**

NEP-Vertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40 % of total marks)
	Code	Name			ISA	MSE	ESE	
BSC	BS03	Engineering Mathematics-II	Theory	3	20	30	50	100
BSC	BS14T	Physics	Theory	2	15	20	40	075
BSC	BS14P	Physics Lab	Lab	1	25	-	25	050
ESC	ES10	Computer Organization and Architecture	Theory	3	20	30	50	100
PC_PCC	CE01T	Data Structure	Theory	2	15	20	40	075
PC_PCC	CE01P	Data Structure Lab	Practical	1	25	-	25	050
SC_VSEC	ES05T	Object-Oriented Programming	Theory	2	15	20	40	075
SC_VSEC	ES05P	Object-Oriented Programming Lab	Lab	1	25	-	25	050
HSSM_IKS	GEXXX*	Any HSSM_IKS course	Theory	2	25	-	50	075
LLC_CC	GEXX*	Any LLC_CC course offered	Theory	2	25	-	50	075
<b>Total Credits</b>				<b>19</b>				

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

\*Selection based on the subset of 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.

**Second Year B. Tech. Computer Engineering  
Course Structure and Assessment Guidelines**

**Preferred Semester: III**

NEP-Vertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40 % of total marks)
	Code	Name			ISA	MSE	ESE	
BSC	BS41	Engineering Mathematics-III	Theory	3	20	30	50	100
PC_PCC	CE02T	Microprocessor	Theory	2	15	20	40	075
PC_PCC	CE02P	Microprocessor Lab	Practical	1	25	-	25	050
PC_PCC	CE04T	Analysis of Algorithms	Theory	2	15	20	40	075
PC_PCC	CE04P	Analysis of Algorithms Lab	Practical	1	25	-	25	050
PC_PCC	CE05T	Database Management Systems	Theory	2	15	20	40	075
PC_PCC	CE05P	Database Management Systems Lab	Practical	1	25	-	25	050
CEP/FP	GESB01	Social Service Internship/ Project	Practical	3	50	-	50	100
MDM	XX*	Multidisciplinary Elective 1	Theory	2	As per course			
HSSM_AEC	HS04	Presentation Skills	Practical	1	50	-	-	050
HSSM_EEMC	GEXX/HS06	Any HSSM_EEMC course offered	As per course	3	As per course			
<b>Total Credits</b>				<b>21</b>				

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

\*Selection based on the subset of 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.



**Second Year B. Tech. Computer Engineering  
Course Structure and Assessment Guidelines**

**Preferred Semester: IV**

NEP-Vertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
BSC	BS42	Engineering Mathematics-IV	Theory	3	20	30	50	100
PC_PCC	CE06T	Computer Graphics	Theory	2	15	20	40	075
PC_PCC	CE06P	Computer Graphics Lab	Practical	1	25	-	25	050
PC_PCC	CE07T	Operating Systems	Theory	2	15	20	40	075
PC_PCC	CE07P	Operating Systems Lab	Practical	1	25	-	25	050
PC_PCC	CE09	Theory of Computer Science	Theory+ Tutorial	3	40	20	40	100
PC_PCC	CE11T	Computer Networks	Theory	2	15	20	40	075
PC_PCC	CE11P	Computer Networks Lab	Practical	1	25	-	25	050
SC_VSEC	ES11	Python Programming	Practical	2	50	-	25	075
HSSM_VEC	GEXX/ HSXX*	Any HSSM_VEC course	Theory	3	As per course			
<b>Total Credits</b>				<b>20</b>				

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

\*Selection based on the subset of 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.

**Third Year B. Tech. Computer Engineering**

**Preferred Semester: V**

**Course Structure and Assessment Guidelines**

NEP-Vertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
PC_PCC	CE10T	Artificial Intelligence	Theory	2	15	20	40	075
PC_PCC	CE10P	Artificial Intelligence Lab	Practical	1	25	-	25	050
PC_PCC	CE12T	Software Engineering	Theory	2	15	20	40	075
PC_PCC	CE12P	Web Design Lab	Practical	1	25	-	25	050
PC_PCC	CE15	System Programming and Compiler Design	Theory	3	20	30	50	100
PC_PCC	CE16T	Distributed Systems	Theory	2	15	20	40	075
PC_PCC	CE16P	Distributed Systems Lab	Practical	1	25	-	25	050
PC_PEC	CEXXT	Professional Elective-1	Theory	2	15	20	40	075
PC_PEC	CEXXP	Professional Elective-1 Lab	Practical	1	25	-	25	050
Int./ OJT	CE45	Mini-Project	Practical	2	25	-	50	075
MDM	XX*	As per MDM course list	As per course	3	As per course			
<b>Total Credits</b>				<b>20</b>				

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

\*Selection based on the subset of 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.

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

**Important Note 1:** Learners are required to go through the 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 (CEXX)**

Course Code	Course Name	Specialization Track Name
CE22T	Data Warehousing and Data Mining	Artificial Intelligence and Machine Learning (AIML)
CE22P	Data Warehousing and Data Mining Lab	
CE22T	Data Warehousing and Data Mining	Data Analytics (DA)
CE22P	Data Warehousing and Data Mining Lab	
CE23T	Modern Sensors for Internet of Things	Internet of Things (IoT)
CE23P	Modern Sensors for Internet of Things lab	
CE24T	Cryptography and Network Security	Cyber Security (CSec)
CE24P	Cryptography and Network Security Lab	

#For details of Specialization Certificate, refer Appendix-A

**Third Year B. Tech. Computer Engineering  
Course Structure and Assessment Guidelines**

**Preferred Semester: VI**

NEP-Vertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
PC_PCC	CE13T	Machine Learning	Theory	2	15	20	40	075
PC_PCC	CE13P	Machine Learning Lab	Practical	1	25	-	25	050
PC_PCC	CE14P	Cloud Computing Lab	Practical	1	25	-	25	050
PC_PCC	CE44	Machine Vision using Python	Practical	2	50	-	25	075
PC_PEC	CEXXT	Professional Elective-2	Theory	2	15	20	40	075
PC_PEC	CEXXP	Professional Elective-2 Lab	Practical	1	25	-	25	050
PC_PEC	CEXXT	Professional Elective-3	Theory	2	15	20	40	075
PC_PEC	CEXXP	Professional Elective-3 Lab	Practical	1	25	-	25	050
Int./OJT	CE47	Project-1 (Synopsis)	Theory	3	50	-	50	100
MDM	XX*	As per MDM course list	As per course	3	As per course			
HSSM_VEC	GEXX/ HSXX*	Any HSSM_VEC course	Theory	2	As per course			
<b>Total Credits</b>				<b>20</b>				

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

\*Selection based on the subset of 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.

**Professional Elective-2 Courses (CEXX)**

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)	CE21T	Soft Computing	Theory	2	15	20	40	075
	CE21P	Soft Computing Lab	Practical	1	25	-	25	050
Data Science (DS)	CE26T	Advanced Databases	Theory	2	15	20	40	075
	CE26P	Advanced Databases Lab	Practical	1	25	-	25	050
Internet of Things (IoT)	CE31T	Embedded Systems Design and Tiny OS	Theory	2	15	20	40	075
	CE31P	Embedded Systems Design and Tiny OS Lab	Practical	1	25	-	25	050
Computer Security (CSec)	CE28T	System Security and Ethical Hacking	Theory	2	15	20	40	075
	CE28P	System Security and Ethical Hacking Lab	Practical	1	25	-	25	050

#For details of Specialization Certificate, refer Appendix-A

**Professional Elective-3 Courses (CEXX)**

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)	CE30	Probabilistic and Graphical Model	Theory + Tutorial	3	40	20	40	100
Data Science (DS)	CE30	Probabilistic and Graphical Model	Theory + Tutorial	3	40	20	40	100
Internet of Things (IoT)	CE42T	Principles of Internet of Things	Theory	2	15	20	40	075
	CE42P	Principles of Internet of Things Lab	Practical	1	25	-	25	050
Computer Security (CSec)	CE41T	Digital Forensics	Theory	2	15	20	40	075
	CE41P	Digital Forensics Lab	Practical	1	25	-	25	050

#For details of Specialization Certificate, refer Appendix-A

**Final Year B. Tech. Computer Engineering**

**Preferred Semester: VII**

**Course Structure and Assessment Guidelines**

NEP-Vertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
PC_PCC	CE17	Programming with R	Practical	1	25	-	25	050
PC_PCC	CE43	DevOps	Practical	2	50	-	25	075
PC_PEC	CEXXT	Professional Elective-4	Theory	2	15	20	40	075
PC_PEC	CEXXP	Professional Elective-4 Lab	Practical	1	25	-	25	050
PC_PEC	CEXXT	Professional Elective-5	Theory	2	15	20	40	075
PC_PEC	CEXXP	Professional Elective-5 Lab	Practical	1	25	-	25	050
PC_PEC	CEXXT	Professional Elective-6	Theory	2	15	20	40	075
PC_PEC	CEXXP	Professional Elective-6 Lab	Practical	1	25	-	25	050
Project	CE48	Project-2 (Final)	Theory+Practical	4	75	-	50	125
Project	CE49	Publication	Theory	2	25	-	50	075
MDM	XX*	As per MDM course list	As per course	3	As per course			
<b>Total Credits</b>				<b>21</b>				

ISA=In Semester Assessment, MSE= Mid Semester Examination, ESE= 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 (CEXX)**

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	CE25T	Natural language processing	Theory	2	15	20	40	075
	CE25P	Natural language processing Lab	Practical	1	25	-	25	050

Specialization Track Name#	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
Learning (AIML)								
Data Science (DS)	CE27T	Text, Web & Social Media Analytics	Theory	2	15	20	40	075
	CE27P	Text, Web & Social Media Analytics Lab	Practical	1	25	-	25	050
Internet of Things (IoT)	CE37T	IoT & Edge Computing	Theory	2	15	20	40	075
	CE37P	IoT & Edge Computing Lab	Practical	1	25	-	25	050
Computer Security (CSec)	CE32T	Web Application Security	Theory	2	15	20	40	075
	CE32P	Web Application Security Lab	Practical	1	25	-	25	050

#For details of Specialization Certificate, refer Appendix-A

#### Professional Elective-5 Courses (CEXX)

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)	CE29T	Advance Machine Learning	Theory	2	15	20	40	075
	CE29P	Advance Machine Learning Lab	Practical	1	25	-	25	050
Data Science (DS)	CE34T	Big Data Analytics	Theory	2	15	20	40	075
	CE34P	Big Data Analytics Lab	Practical	1	25	-	25	050
Internet of Things (IoT)	CE39T	IoT Security & Trust	Theory	2	15	20	40	075
	CE39P	IoT Security & Trust Lab	Practical	1	25	-	25	050
Computer Security (CSec)	CE35T	Malware Analysis	Theory	2	15	20	40	075
	CE35P	Malware Analysis Lab	Practical	1	25	-	25	050

#For details of Specialization Certificate, refer Appendix-A



**Professional Elective-6 Courses (CEXX)**

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)	CE33T	Deep learning	Theory	2	15	20	40	075
	CE33P	Deep learning Lab	Practical	1	25	-	25	050
Data Science (DS)	CE38T	Recommendation System	Theory	2	15	20	40	075
	CE38P	Recommendation System Lab	Practical	1	25	-	25	050
Internet of Things (IoT)	CE40T	Industrial IoT	Theory	2	15	20	40	075
	CE40P	Industrial IoT Lab	Practical	1	25	-	25	050
Computer Security (CSec)	CE36T	Mobile and Wireless Security	Theory	2	15	20	40	075
	CE36P	Mobile and Wireless Security Lab	Practical	1	25	-	25	050

#For details of Specialization Certificate, refer Appendix-A

**Final Year B. Tech. Computer Engineering  
Course Structure and Assessment Guidelines**

**Preferred Semester: VIII**

NEP-Vertical	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
MDC_OE	OEXX*	Any three from the offered Open Elective courses	Theory	3	20	30	50	100
MDC_OE	OEXX*		Theory	3	20	30	50	100
MDC_OE	OEXX*		Theory	2	15	20	40	075
Int./OJT	CE46	Industry Internship	Internship	7	100	-	100	200
ELC_RM	OE37	Research Methodology	Theory	3	20	30	50	100
MDM	XX*	As per MDM course list	As per course	3	As per course			
<b>Total Credits</b>				<b>21</b>				

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

\*Selection is based on subset of 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.

## 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 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 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 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	CE22T	Data Warehousing and Data Mining
V	CE22P	Data Warehousing and Data Mining Lab
VI	CE21T	Soft Computing
VI	CE21P	Soft Computing Lab
VI	CE30	Probabilistic and Graphical Model
VII	CE25T	Natural Language Processing
VII	CE25P	Natural Language Processing Lab
VII	CE29T	Advance Machine Learning
VII	CE29P	Advance Machine Learning Lab
VII	CE33T	Deep learning
VII	CE33P	Deep learning Lab

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

Semester	Course Code	Course Name
V	CE22T	Data Warehousing and Data Mining
V	CE22P	Data Warehousing and Data Mining Lab
VI	CE26T	Advance Databases
VI	CE26P	Advance Databases Lab
VI	CE30	Probabilistic and Graphical Model
VII	CE27T	Text, Web & Social Media Analytics

Semester	Course Code	Course Name
VII	CE27P	Text, Web & Social Media Analytics Lab
VII	CE34T	Big Data Analytics
VII	CE34P	Big Data Analytics Lab
VII	CE38T	Recommendation System
VII	CE38P	Recommendation System Lab

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

Semester	Course Code	Course Name
V	CE23T	Modern Sensors for Internet of Things
V	CE23P	Modern Sensors for Internet of Things Lab
VI	CE31T	Embedded Systems Design and Tiny OS
VI	CE31P	Embedded Systems Design and Tiny OS Lab
VII	CE37T	IoT & Edge Computing
VII	CE37P	IoT & Edge Computing Lab
VII	CE39T	IoT Security & Trust
VII	CE39P	IoT Security & Trust Lab
VII	CE40T	Industrial IoT
VII	CE40P	Industrial IoT Lab

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

Semester	Course Code	Course Name
V	CE24T	Cryptography and Network Security
V	CE24P	Cryptography Lab and Network Security Lab
VI	CE28T	System Security and Ethical Hacking
VI	CE28P	System Security and Ethical Hacking Lab
VI	CE41T	Digital Forensics
VI	CE41P	Digital Forensics Lab
VII	CE32T	Web Application Security
VII	CE32P	Web Application Security Lab
VII	CE35T	Malware Analysis
VII	CE35P	Malware Analysis Lab
VII	CE36T	Mobile and Wireless Security
VII	CE36P	Mobile and Wireless Security Lab