Vidyalankar Institute of Technology

An Autonomous Institute affiliated to University of Mumbai

Bachelor of Technology

in

Computer Engineering

Programme Structure (R-2022)

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

Preamble

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

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

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

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

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

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

Chairman, Academic Council
Vidyalankar Institute of Technology

COMPETENCE BASED COURSE CATEGORY AND CREDIT ALLOTMENT

Sr. No.	Competence	Course Category	Credits / Audit
I	Knowledge	Basic Science	20
II		Engineering Science	15
III		Core	48
IV	Skill	Professional Elective	18
V		Open Elective	15
VI		Project and Internship	16
VII	Attitude	Humanities, Social Sciences and Management	14
VIII		General Education	16
Total			**162**

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

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

Structure of Honours/ Minor Degree

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

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

Definition of Credit

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

Courses Under Various Categories

I. Basic Science Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	BS01*	Engineering Mathematics-I	3	-	-	3	1
2	BS03*	Engineering Mathematics-II	3	-	-	3	2
3	BS05	Engineering Mathematics-III	3	-	-	3	3
4	BS07	Engineering Mathematics-IV	3	-	-	3	4
5	BS12	Engineering Mathematics-V	3	-	-	3	5
6	BS14T*	Physics	2	-	-	2	2
7	BS14P*	Physics Lab	-	2	-	1	2
8	BS17	Biology	2	-	-	2	3
9	BS19	Chemistry	2	-	-	2	3

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

II. Engineering Science Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	ES01T*	Engineering Graphics	2	-	-	2	1
2	ES01P*	Engineering Graphics Lab	-	2	-	1	1
3	ES04T*	Structured Programming	2	-	-	2	1
4	ES04P*	Structured Programming Lab	-	2	-	1	1
5	ES05T*	Object Oriented Programming	2	-	-	2	2
6	ES05P*	Object Oriented Programming Lab	-	2	-	1	2
7	ES06T*	Fundamentals of Computer Hardware and Networking	2	-	-	2	1
8	ES06P*	Fundamentals of Computer Hardware and Networking Lab	-	2	-	1	1
9	ES07T*	Fundamental of Logic Circuits	2	-	-	2	2
10	ES07P*	Fundamental of Logic Circuits Lab	-	2	-	1	2

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

III. Core Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	CE01T	Data Structure	2	-	-	2	3
2	CE01P	Data Structure Lab	-	2	-	1	3
3	CE02T	Microprocessor	2	-	-	2	3
4	CE02P	Microprocessor Lab	-	2	-	1	3
5	CE03T	Digital Logic and Computer Organization	2	-	-	2	3
6	CE03P	Digital Logic and Computer Organization Lab	-	2	-	1	3
7	CE04T	Analysis of Algorithms	2	-	-	2	4
8	CE04P	Analysis of Algorithms Lab	-	2	-	1	4
9	CE05T	Database Management Systems	2	-	-	2	4
10	CE05P	Database Management Systems Lab	-	2	-	1	4
11	CE06T	Computer Graphics	2	-	-	2	4
12	CE06P	Computer Graphics Lab	-	2	-	1	4
13	CE07T	Operating Systems	2	-	-	2	4
14	CE07P	Operating Systems Lab	-	2	-	1	4
15	CE08	Software Lab	-	4	-	2	4
16	CE09	Theory of Computational Science	2	-	1	3	5
17	CE10T	Artificial Intelligence	2	-	-	2	5
18	CE10P	Artificial Intelligence Lab	-	2	-	1	5
19	CE11T	Computer Networks	2	-	-	2	5
20	CE11P	Computer Networks Lab	-	2	-	1	5
21	CE12T	Software Engineering	2	-	-	2	5
22	CE12P	Web Design Lab	-	2	-	1	5
23	CE13T	Machine Learning	2	-	-	2	6
24	CE13P	Machine Learning Lab	-	2	-	1	6
25	CE14	Cloud Computing Lab	-	2	-	1	6
26	CE15	System Programming and Compiler Design	3	-	-	3	6
27	CE16T	Distributed Systems	2	-	-	2	6
28	CE16P	Distributed Systems Lab	-	2	-	1	6
29	CE17	Programming with R	-	2	-	1	7
30	CE44	Machine Vision using Python Lab		4		2	6

IV. Professional 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
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	Computer and Network Security	2	-	-	2	5
8	CE24P	Computer 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	2	-	1	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

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
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
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. Open Elective Courses

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

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
9	OE29	Energy Audit and Management	3	-	-	3	8
10	OE30	Bioinformatics	3	-	-	3	8
11	OE31	Nanotechnology	3	-	-	3	8

VI. Project and Internship

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	-	150 (total)	-	5	Break after Sem. 6
3	CE47	Project-1 (Synopsis)	3	-	-	3	7
4	CE48	Project-2 (Final)	2	8	-	6	8

VII. Humanities, Social Sciences and Management Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	HS01T*	Effective Communication	2	-	-	2	1
2	HS01P*	Effective Communication Lab	-	2	-	1	1
3	HS02T*	Professional Skills	2	-	-	2	2
4	HS02P*	Professional Skills Lab	-	2	-	1	2
5	HS03	Technical and Business Writing	1	2	-	2	3
6	HS04	Presentation Skills	-	2	-	1	5
7	HS05*	E-Waste and Environmental Management	2	-	-	2	1
8	HS06	Principles of Economics and Management	2	-	1	3	4

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

VIII. General Education

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

GE Sub-Category	GE Sub-Category Code
Wonders of Infrastructure	WI

Courses under General Education (GE) Category

Course Code	Course Name	Credits
GEA01	Voice Culture for Professional Speaking	2
GEA02	Various Dance Forms	2
GEA03	Exploring Indian Art	2
GESB01[#]	Social Service Internship/ Project	3
GESB02	Universal Human Values	2
GESB03	Indian Traditional Knowledge System	2
GESB04	Corporate and Social Etiquettes	2
GESB05	Global Citizenship Education	2
GESB06	Responsibility towards sustainable environment	2
GESB07	Psychology	2
GECI01T	Design Thinking	2
GECI01P	Design Thinking Lab	1
GECI02	Innovation and Entrepreneurship	2
GEPS01	Indian Constitution	2
GEPS02	Four Pillars of Democratic Nation	2
GEPEW01	Wellness – Body, Mind & Spirit	2
GEPEW02	IQ vs EQ	2
GEPEW03	Nutrition and Physical Wellness	2
GEF01	Basics of Finance & Legal aspects for Business	2
GEF02	Financial Management for beginners	2
GENS01	Facets of Astronomy	2
GENS02	Modern Farming	2
GEWI01	Railways - Wonders of Infrastructure	2
GE01[$]	Internship with other Institutes (Credit Transfer)	4

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

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

Note: 07 credits, of required 16 credits, under GE category are exempted for Direct Second Year (DSY) students who will secure admission through lateral entry from the A.Y. 2023-24. Such students can opt for any courses from the above list to fulfil the required credits for the award of degree.

Course Structure and Assessment Guidelines

for

Bachelor of Technology

in

Computer Engineering

First Year B. Tech. Computer Engineering **Semester: I**

Course Structure and Assessment Guidelines

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
HS01T	Effective Communication	Theory	2	15	20	40	075
HS01P	Effective Communication Lab	Practical	1	25	-	25	050
HS05	E-waste and Environmental Management	Theory	2	15	20	40	075
BS01	Engineering Mathematics-I	Theory	3	20	30	50	100
ES01T	Engineering Graphics	Theory	2	15	20	40	075
ES01P	Engineering Graphics Lab	Practical	1	25	-	25	050
ES04T	Structured Programming	Theory	2	15	20	40	075
ES04P	Structured Programming Lab	Practical	1	25	-	25	050
ES06T	Fundamentals of Computer Hardware and Networking	Theory	2	15	20	40	075
ES06P	Fundamentals of Computer Hardware and Networking Lab	Practical	1	25	-	25	050
GEXX*	Any GE course from the below list	As per course	2	As per course			
		Total	**19**				

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

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

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

List of General Education Elective Courses (GEXX)

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
GEA01	Voice Culture for Professional Speaking	Theory	2	25	-	50	075
GEA02	Various Dance Forms	Theory	2	25	-	50	075
GEA03	Exploring Indian Art	Theory	2	25	-	50	075
GESB02	Universal Human Values	Theory	2	25	-	25	050
GESB03	Indian Traditional Knowledge System	Theory	2	25	-	50	075
GESB04	Corporate and Social Etiquettes	Theory	2	25	-	25	050
GESB05	Global Citizenship Education	Theory	2	25	-	50	075
GESB06	Responsibility towards sustainable environment	Theory	2	25	-	50	075
GESB07	Psychology	Theory	2	25	-	50	075
GECI02	Innovation and Entrepreneurship	Theory	2	25	-	50	075
GEPS01	Indian Constitution	Theory	2	25	-	50	075
GEPS02	Four Pillars of Democratic Nation	Theory	2	25	-	50	075
GEPEW01	Wellness – Body, Mind & Spirit	Theory	2	25	-	25	050
GEPEW02	IQ vs EQ	Theory	2	25	-	50	075
GEPEW03	Nutrition and Physical Wellness	Theory	2	25	-	50	075
GEF01	Basics of Finance & Legal aspects for Business	Theory	2	25	-	50	075
GEF02	Financial Management for beginners	Theory	2	25	-	50	075
GENS01	Facets of Astronomy	Theory	2	25	-	50	075
GENS02	Modern Farming	Theory	2	25	-	50	075
GEWI01	Railways - Wonders of Infrastructure	Theory	2	25	-	50	075

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

Course Structure and Assessment Guidelines

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
HS02T	Professional Skills	Theory	2	15	20	40	075
HS02P	Professional Skills Lab	Practical	1	25	-	25	050
BS03	Engineering Mathematics-II	Theory	3	20	30	50	100
BS14T	Physics	Theory	2	15	20	40	075
BS14P	Physics Lab	Practical	1	25	-	25	050
ES05T	Object-Oriented Programming	Theory	2	15	20	40	075
ES05P	Object-Oriented Programming Lab	Practical	1	25	-	25	050
ES07T	Fundamental of Logic Circuits	Theory	2	15	20	40	075
ES07P	Fundamental of Logic Circuits Lab	Practical	1	25	-	25	050
GECI01T	Design Thinking	Theory	2	15	20	40	075
GECI01P	Design Thinking Lab	Practical	1	-	-	50	050
GEXX*	Any GE course from the below list	As per course	2	As per course			
		Total	**20**				

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

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

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

List of General Education Elective Courses (GEXX)

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
GEA01	Voice Culture for Professional Speaking	Theory	2	25	-	50	075
GEA02	Various Dance Forms	Theory	2	25	-	50	075
GEA03	Exploring Indian Art	Theory	2	25	-	50	075
GESB02	Universal Human Values	Theory	2	25	-	25	050
GESB03	Indian Traditional Knowledge System	Theory	2	25	-	50	075
GESB04	Corporate and Social Etiquettes	Theory	2	25	-	25	050
GESB05	Global Citizenship Education	Theory	2	25	-	50	075
GESB06	Responsibility towards sustainable environment	Theory	2	25	-	50	075
GESB07	Psychology	Theory	2	25	-	50	075
GECI02	Innovation and Entrepreneurship	Theory	2	25	-	50	075
GEPS01	Indian Constitution	Theory	2	25	-	50	075
GEPS02	Four Pillars of Democratic Nation	Theory	2	25	-	50	075
GEPEW01	Wellness – Body, Mind & Spirit	Theory	2	25	-	25	050
GEPEW02	IQ vs EQ	Theory	2	25	-	50	075
GEPEW03	Nutrition and Physical Wellness	Theory	2	25	-	50	075
GEF01	Basics of Finance & Legal aspects for Business	Theory	2	25	-	50	075
GEF02	Financial Management for beginners	Theory	2	25	-	50	075
GENS01	Facets of Astronomy	Theory	2	25	-	50	075
GENS02	Modern Farming	Theory	2	25	-	50	075
GEWI01	Railways - Wonders of Infrastructure	Theory	2	25	-	50	075

Second Year B. Tech. Computer Engineering **Semester: III**

Course Structure and Assessment Guidelines

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
HS03	Technical and Business Writing	Theory + Practical	2	75	-	-	075
BS05	Engineering Mathematics-III	Theory	3	20	30	50	100
BSXX	Basic Science Elective	Theory	2	As per course			
CE01T	Data Structure	Theory	2	15	20	40	075
CE01P	Data Structure Lab	Practical	1	25	-	25	050
CE02T	Microprocessor	Theory	2	15	20	40	075
CE02P	Microprocessor Lab	Practical	1	25	-	25	050
CE03T	Digital Logic and Computer Organization	Theory	2	15	20	40	075
CE03P	Digital Logic and Computer Organization Lab	Practical	1	25	-	25	050
GEXXX*	Any GE course from the below list	As per course	2	As per course			
GESB01#	Social Service Internship/ Project	Practical	3	50	-	50	100
		Total	**21**				

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

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

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

NOTE: As per Institute guidelines, the 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.

Basic Science Elective Courses (BSXX)

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
BS17	Biology	Theory	2	15	20	40	075
BS19	Chemistry	Theory	2	15	20	40	075

List of General Education Elective Courses (GEXX)

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
GEA01	Voice Culture for Professional Speaking	Theory	2	25	-	50	075
GEA02	Various Dance Forms	Theory	2	25	-	50	075
GEA03	Exploring Indian Art	Theory	2	25	-	50	075
GESB02	Universal Human Values	Theory	2	25	-	25	050
GESB03	Indian Traditional Knowledge System	Theory	2	25	-	50	075
GESB04	Corporate and Social Etiquettes	Theory	2	25	-	25	050
GESB05	Global Citizenship Education	Theory	2	25	-	50	075
GESB06	Responsibility towards sustainable environment	Theory	2	25	-	50	075
GESB07	Psychology	Theory	2	25	-	50	075
GECI02	Innovation and Entrepreneurship	Theory	2	25	-	50	075
GEPS01	Indian Constitution	Theory	2	25	-	50	075
GEPS02	Four Pillars of Democratic Nation	Theory	2	25	-	50	075
GEPEW01	Wellness – Body, Mind & Spirit	Theory	2	25	-	25	050
GEPEW02	IQ vs EQ	Theory	2	25	-	50	075
GEPEW03	Nutrition and Physical Wellness	Theory	2	25	-	50	075
GEF01	Basics of Finance & Legal aspects for Business	Theory	2	25	-	50	075
GEF02	Financial Management for beginners	Theory	2	25	-	50	075
GENS01	Facets of Astronomy	Theory	2	25	-	50	075
GENS02	Modern Farming	Theory	2	25	-	50	075
GEWI01	Railways - Wonders of Infrastructure	Theory	2	25	-	50	075

Second Year B. Tech. Computer Engineering **Semester: IV**

Course Structure and Assessment Guidelines

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	**Name**			**ISA**	**MSE**	**ESE**	
HS06	Principles of Economics and Management	Theory+ Tutorial	3	40	20	40	100
BS07	Engineering Mathematics-IV	Theory	3	20	30	50	100
CE04T	Analysis of Algorithms	Theory	2	15	20	40	075
CE04P	Analysis of Algorithms Lab	Practical	1	25	-	25	050
CE05T	Database Management Systems	Theory	2	15	20	40	075
CE05P	Database Management Systems Lab	Practical	1	25	-	25	050
CE06T	Computer Graphics	Theory	2	15	20	40	075
CE06P	Computer Graphics Lab	Practical	1	25	-	25	050
CE07T	Operating Systems	Theory	2	15	20	40	075
CE07P	Operating Systems Lab	Practical	1	25	-	25	050
CE08	Software Lab	Practical	2	50	-	25	075
		Total	**20**				
Course credits completed during the previous inter-semester break will appear in this semester's marksheet							
GESB01	Social Service Internship/ Project	Practical	3	50	-	50	100

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.

Second 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	
GE01[$]	Internship with other Institutes (Credit Transfer)	As per course	4	125	-	-	125

[$] **For GE01- Internship with other Institutes (Credit Transfer):** Internship with other reputed institutes equivalent to 4 credits is recommended to be done by learner during second year inter semester break (i.e. summer break between semester 4 and semester 5).
NOTE: As per Institute guidelines, the results of courses completed in inter-semester break will appear in the marksheet of the next semester.

Third Year B. Tech. Computer Engineering **Semester: V**

Course Structure and Assessment Guidelines

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
HS04	Presentation Skills	Practical	1	50	-	-	050
BS12	Engineering Mathematics-V	Theory	3	20	30	50	100
CE09	Theory of Computer Science	Theory+ Tutorial	3	40	20	40	100
CE10T	Artificial Intelligence	Theory	2	15	20	40	075
CE10P	Artificial Intelligence	Practical	1	25	-	25	050
CE11T	Computer Networks	Theory	2	15	20	40	075
CE11P	Computer Networks Lab	Practical	1	25	-	25	050
CE12T	Software Engineering	Theory	2	15	20	40	075
CE12P	Web Design Lab	Practical	1	25	-	25	050
CEXX	Professional Elective-1	As per course	3	As per course			
CE45	Mini-Project	Practical	2	25	-	50	075
		Total	**21**				
Course credits completed during the previous inter-semester break will appear in this semester's marksheet							
GE01	Internship with other Institutes (Credit Transfer)	As per course	4	125	-	-	125

ISA=In Semester Assessment, MSE= Mid Semester Examination, 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 Professional Elective Courses and Specialization Certificate – Refer Appendix-A

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)

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)	CE22T	Data Warehousing and Data Mining	Theory	2	15	20	40	075
	CE22P	Data Warehousing and Data Mining Lab	Practical	1	25	-	25	050
Data Science (DS)	CE22T	Data Warehousing and Data Mining	Theory	2	15	20	40	075
	CE22P	Data Warehousing and Data Mining Lab	Practical	1	25	-	25	050
Internet of Things (IoT)	CE23T	Modern Sensors for Internet of Things	Theory	2	15	20	40	075
	CE23P	Modern Sensors for Internet of Things Lab	Practical	1	25	-	25	050
Computer Security (CSec)	CE24T	Computer and Network Security	Theory	2	15	20	40	075
	CE24P	Computer and Network Security Lab	Practical	1	25	-	25	050

[#]For details of Specialization Certificate, refer Appendix-A

Guidelines for Award of Honours/ Minor Degree

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

Third Year B. Tech. Computer Engineering **Semester: VI**

Course Structure and Assessment Guidelines

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
CE13T	Machine Learning	Theory	2	15	20	40	075
CE13P	Machine Learning Lab	Practical	1	25	-	25	050
CE14	Cloud Computing Lab	Practical	1	25	-	25	050
CE15	System Programming and Compiler Design	Theory	3	20	30	50	100
CE16T	Distributed Systems	Theory	2	15	20	40	075
CE16P	Distributed Systems Lab	Practical	1	25	-	25	050
CE44	Machine Vision using Python Lab	Practical	2	50	-	25	075
CEXX	Professional Elective-2	As per course	3	As per course			
CEXX	Professional Elective-3	As per course	3	As per course			
		Total	**18**				

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.

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

Specialization Track Name#	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
	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

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	
CE46*	Industry Internship	Practical	5	75	-	75	150

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

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

Final Year B. Tech. Computer Engineering **Semester: VII**

Course Structure and Assessment Guidelines

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	Name			ISA	MSE	ESE	
CE17	Programming with R	Practical	1	25	-	25	50
CEXX	Professional Elective-4	As per course	3	As per course			
CEXX	Professional Elective-5	As per course	3	As per course			
CEXX	Professional Elective-6	As per course	3	As per course			
OEXX*	Any two from the offered Open Elective courses	Theory	3	20	30	50	100
OEXX*		Theory	3	20	30	50	100
CE47	Project-1 (Synopsis)	Theory	3	50	-	50	100
		Total	**19**				
Course credits completed during the previous inter-semester break will appear in this semester's marksheet							
CE46	Industry Internship	Practical	5	75	-	75	150

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

Specialization Track Name#	Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
	Code	Name			ISA	MSE	ESE	
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 **Semester: VIII**

Course Structure and Assessment Guidelines

Course		Head of Learning	Credits	Assessment Guidelines (Marks)			Total marks (Passing@40% of total marks)
Code	**Name**			**ISA**	**MSE**	**ESE**	
OEXX*	Any three from the offered Open Elective courses	Theory	3	20	30	50	100
OEXX*		Theory	3	20	30	50	100
OEXX*		Theory	3	20	30	50	100
CE48	Project-2 (Final)	Theory + Practical	6	100	-	75	175
		Total	**15**				

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.

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	CE42T	Principles of Internet of Things
VI	CE42P	Principles of 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	Computer and Network Security
V	CE24P	Computer 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