

Mahatma Education Society's

# **Pillai College of Engineering**

*(Autonomous)*

**Affiliated to University of Mumbai**

Dr. K. M. Vasudevan Pillai's Campus, Sector 16, New Panvel – 410 206.



**AUTONOMOUS**

**Department of Computer Engineering**

**Syllabus**

*of*

**B.Tech. in Computer Engineering**

*for*

**The Admission Batch of AY 2021-22**

**First Year** - Effective from Academic Year **2021-22**

**Second Year** - Effective from Academic Year **2022-23**

**Third Year** - Effective from Academic Year **2023-24**

**Fourth Year** - Effective from Academic Year **2024-25**

*as per*

**Choice Based Credit and Grading System**

Mahatma Education Society's

## **Pillai College of Engineering**

### **Vision**

Pillai College of Engineering (PCE) will admit, educate and train a diverse population of students who are academically prepared to benefit from the Institute's infrastructure and faculty experience, to become responsible professionals or entrepreneurs in a technical arena. It will further attract, develop and retain, dedicated, excellent teachers, scholars and professionals from diverse backgrounds whose work gives them knowledge beyond the classroom and who are committed to making a significant difference in the lives of their students and the community.

### **Mission**

To develop professional engineers with respect for the environment and make them responsible citizens in technological development both from an Indian and global perspective. This objective is fulfilled through quality education, practical training and interaction with industries and social organizations.



Dr. K. M. Vasudevan Pillai's Campus , Sector - 16, New Panvel – 410 206

# **Department of Computer Engineering**

## **Vision**

To evolve as a centre of academic excellence and to adapt itself to the rapid advancements in the Computer Engineering field.

## **Mission**

To produce highly qualified, well rounded and motivated graduates who can meet new technical challenges, contribute effectively as team members and be innovators in computer hardware, software, design and application. To pursue creative research and new technologies in computer engineering and across disciplines in order to serve the needs of industry, government, society and the scientific community. To inculcate strong ethical values and responsibility towards society.

## **Program Educational Objectives (PEOs):**

- I. Our graduates will have knowledge, skills and attitude that will allow them to contribute significantly to the research and the discovery of new knowledge and methods in computing and enable them to communicate effectively and work in a team.
- II. Our graduates will function ethically and responsibly, and will remain informed and involved as full participants in our profession and our society. Our graduates will successfully function in multi-disciplinary teams.
- III. Our graduates will apply the basic principles and practices of engineering in the computing domain to the benefit of society and to pursue lifelong learning and professional developments.
- IV. Our graduates will use theoretical and technical computer science knowledge to specify requirements, develop a design, and implement and verify a solution for computing systems of different levels of complexity.

## **Program Outcomes:**

Engineering Graduates will be able to:

1. **Engineering knowledge:**  
Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:**  
Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:**  
Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:**  
Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:**  
Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:**  
Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:**  
Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:**  
Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:**  
Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:**  
Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:**  
Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:**  
Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**Program Specific Outcomes (PSOs):**

1. To analyze, design and develop computer programs using appropriate hardware, software and mathematical models in the areas related to algorithms, system software, multimedia, mobile and web technology, data storage and computing, and networking for efficient and secure systems.
2. To use professional engineering practices, logic and strategies for creating innovative career paths to be an entrepreneur, and an urge to pursue higher studies.
3. To Formulate and solve real life engineering problems for the public health and safety with social and environmental awareness along with ethical responsibility.

The Autonomous status of the institute has given an opportunity to design and frame the curriculum in such a way that it incorporates all the needs and requirements of recent developments in all fields within the scope of the technical education. This curriculum will help graduates to attain excellence in their respective field. The curriculum has a blend of basic and advanced courses along with provision of imparting practical knowledge to students through minor and major projects. The syllabus has been approved and passed by the Board of Studies.

Outcome based education is implemented in the academics and every necessary step is undertaken to attain the requirements. Every course has its objectives and outcomes defined in the syllabus which are met through continuous assessment and end semester examinations. Evaluation is done on the basis of Choice Based Credit and Grading System (CBCGS). Optional courses are offered at department and institute level. Selection of electives from the same specialization makes the student eligible to attain a B. Tech. degree with respective specialization.

Every learner/student will be assessed for each course through (i) an Internal/Continuous assessment during the semester in the form of either Practical Performance, Presentation, Demonstration or written examination and (ii) End Semester Examination (ESE), in the form of either theory or viva voce or practical, as prescribed by the respective Board Studies and mentioned in the assessment scheme of the course content/syllabus. This system involves the Continuous Evaluation of students' progress Semester wise. The number of credits assigned with a course is based on the number of contact hours of instruction per week for the course. The credit allocation is available in the syllabus scheme of each semester.

The performance of a learner in a semester is indicated by a number called Semester Grade Performance Index (SGPI). The SGPI is the weighted average of the grade points obtained in all the courses by the learner during the semester. For example, if a learner passes five courses (Theory/labs./Projects/ Seminar etc.) in a semester with credits C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub>, C<sub>4</sub> and C<sub>5</sub> and learners grade points in these courses are G<sub>1</sub>, G<sub>2</sub>, G<sub>3</sub>, G<sub>4</sub> and G<sub>5</sub> respectively, then learners SGPI is equal to:

$$SGPI = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4G_4 + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

The learner's up to date assessment of the overall performance from the time s/he entered for the programme is obtained by calculating a number called the Cumulative Grade Performance Index (CGPI), in a manner similar to the calculation of SGPI. The CGPI therefore considers all the courses mentioned in the scheme of instructions and examinations, towards the minimum requirement of the degree learners have enrolled for. The CGPI at the end of this semester is calculated as,

$$CGPI = \frac{C_1G_1 + C_2G_2 + C_3G_3 + \dots + C_i * G_i + \dots + C_nG_n}{C_1 + C_2 + C_3 + \dots + C_i + \dots + C_n}$$

The Department of Computer Engineering offers a B. Tech. programme in Computer Engineering. This is an eight-semester course. The complete course is a 160 credit course which comprises core courses and elective courses. The department level elective courses are distributed over 4 specializations. The specializations are:

1. Data Analytics and Language Processing.
2. Network and Information Security.
3. Computational Intelligence and Automation.
4. Systems and Computing.

The students also have a choice of opting for Institute level specializations. These are

1. Business and Entrepreneurship
2. Bioengineering
3. Engineering Design
4. Art and Humanities
5. Applied Science
6. Life Skills, Repair, Maintenance and Safety

**As minimum requirements for the credits to be earned during the B.Tech in Computer Engineering program, a student will have to complete a minimum of three specializations of which two are to be chosen from the department list and one has to be from the Institute level specialization list. In order to complete each specialization, a minimum of three courses under that specialization has to be completed.** The credit requirement for the B.Tech. in Computer Engineering course is tabulated in Table 1.

Table 1. Credit Requirement for B.Tech in Computer Engineering

Category	Credits
Humanities and Social Sciences including Management courses	9
Basic Science courses	26
Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc	30
Professional core courses	49
Professional Elective courses relevant to chosen specialization/branch	23
Open subjects – Electives from other technical and /or emerging subjects	9
Project work, seminar and internship in industry or elsewhere	15
Mandatory Courses - Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge	Non credit courses
<b>Total Credits</b>	<b>161</b>

# Preface by Board of Studies in Computer Engineering

Dear Students and Teachers, we, the members of Board of Studies Computer Engineering, are very happy to present the B.Tech Computer Engineering syllabus effective from the Academic Year 2021-22 . We are sure you will find this syllabus interesting, challenging, and fulfill certain needs and expectations.

Computer Engineering is one of the most sought-after courses amongst engineering students. The syllabus needs revision in terms of preparing the student for the professional scenario relevant and suitable to cater the needs of industry in the present-day context. The syllabus focuses on providing a sound theoretical background as well as good practical exposure to students in the relevant areas. It is intended to provide a modern, industry-oriented education in Computer Engineering. It aims at producing trained professionals who can successfully become acquainted with the demands of the industry worldwide. They obtain skills and experience in up-to-date knowledge to analysis design, implementation, validation, and documentation of computer software and systems.

This syllabus is finalized through a brainstorming session attended by Heads of Department and senior faculty members of Department of Computer Engineering. The syllabus falls in line with the vision and mission of the Computer Engineering Department and various accreditation agencies by keeping an eye on the technological developments, innovations, and industry requirements.

We would like to place on record our gratitude to the faculty, students, industry experts and stakeholders for having helped us in the formulation of this syllabus.

## Board of Studies in Computer Engineering

1. Dr. Sharvari S. Govilkar	Coordinator (Chairman)
2. Dr. Prashant P Nitnaware	Member
3. Prof. Varunakshi Bhojane	Member
4. Prof. Payel Thakur	Member
5. Dr. Neeta Deshpande	Member
6. Dr.Jyoti Malhotra	Member
7. Dr.Kavita Sonawane	Member
8. Prof.Pranita Mahajan	Member
9. Mr. Samir Mahindre	Member
10. Prof. Madhura Vyavahare	Member



**Program Structure for First Year**  
**Bachelor of Technology in Computer Engineering**  
**W.E.F. A.Y. 2021 – 22**

**Semester I**

Course Code	Course Name	Course Component	Teaching Scheme (Contact Hours)		Credits Assigned						
			Theory	Pract.	Theory	Pract.	Total				
CE 101	Engineering Mathematics I	TLP	3	2	3	1	4				
CE 102	Engineering Physics I	TL	2	1	2	0.5	2.5				
CE 103	Engineering Chemistry I	TL	2	1	2	0.5	2.5				
CE 104	Programming with C	TLP	3	2	3	1	4				
CE 105	Basic Electrical and Electronics Engineering*	TL	3	2	3	1	4				
CE 106	Basic Workshop I	L	-	3	-	1.5	1.5				
<b>Total</b>			<b>13</b>	<b>11</b>	<b>13</b>	<b>5.5</b>	<b>18.5</b>				
Course Code	Course Name	Examination Scheme									
		Theory					End Sem Exam	Exam Duration (Hrs)	Term Work	Oral/Pract.	Total
		Internal Assessment			Average						
		1	2	Average							
CE 101	Engineering Mathematics I	40	40	40	60	2	25	-	125		
CE 102	Engineering Physics I	30	30	30	45	2	25	-	100		
CE 103	Engineering Chemistry I	30	30	30	45	2	25	-	100		
CE 104	Programming with C	40	40	40	60	2	25	25	150		
CE 105	Basic Electrical and Electronics Engineering*	40	40	40	60	2	25	25	150		
CE 106	Basic Workshop I	-	-	-	-		50	-	50		
<b>Total</b>				<b>180</b>	<b>270</b>		<b>175</b>	<b>50</b>	<b>675</b>		

**T- Theory , L- Lab , P-Programming, C- Communication**

**\*- The course can be offered in either SEM I or SEM II**

**Program Structure for First Year**  
**Bachelor of Technology in Computer Engineering**  
**W.E.F. A.Y. 2021 – 22**

**Semester II**

Course Code	Course Name	Course Component	Teaching Scheme (Contact Hours)		Credits Assigned				
			Theory	Pract.	Theory	Pract.	Total		
CE 107	Engineering Mathematics II	TLP	3	2	3	1	4		
CE 108	Engineering Physics II	TL	2	1	2	0.5	2.5		
CE 109	Engineering Chemistry II	TL	2	1	2	0.5	2.5		
CE 110	Engineering Mechanics and Graphics*	TL	3	2	3	1	4		
CE 111	Object Oriented Programming with Java	TLP	2	2	2	1	3		
CE 112	Professional communication Skills I	TLC	2	2	2	1	3		
CE 113	Basic Workshop II	L	-	3	-	1.5	1.5		
			<b>15</b>	<b>13</b>	<b>15</b>	<b>6.5</b>	<b>20.5</b>		
Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Oral/ Pract.	Total
		Internal Assessment			End Sem Exam	Exam Duration (Hrs)			
		1	2	Average					
CE 107	Engineering Mathematics II	40	40	40	60	2	25	-	125
CE 108	Engineering Physics II	30	30	30	45	2	25	-	100
CE 109	Engineering Chemistry II	30	30	30	45	2	25	-	100
CE 110	Engineering Mechanics and Graphics*	40	40	40	60	2	25	25	150
CE 111	Object Oriented Programming with Java	30	30	30	45	2	25	25	125
CE 112	Professional communication Skills I	20	20	20	30	1	25	-	75
CE 113	Basic Workshop II	-		-	-	-	50	-	50
<b>Total</b>				<b>190</b>	<b>285</b>		<b>200</b>	<b>50</b>	<b>725</b>

**T- Theory , L- Lab , P-Programming, C- Communication**

**\*- The course can be offered in either SEM I or SEM II**

**Program Structure for Second Year**  
**Bachelor of Technology in Computer Engineering**  
**W.E.F. A.Y. 2022 – 23**  
**Semester III**

Course Code	Course Name	Course Component	Teaching Scheme (Contact Hours)			Credits Assigned			
			Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total
CE 201	Engineering Mathematics III	T	3	-	1*	3	-	1	4
CE 202	Data Structures	TL	3	2	-	3	1	-	4
CE 203	Computer Graphics Virtual Reality	TL	3	2	-	3	1	-	4
CE 204	Digital Logic and Computer Organization and Architecture	TL	3	2	-	3	1	-	4
CE 205	Paradigms and Computer Programming Fundamentals	TP	3	-	-	3	-	-	3
CE 206	Human Values and Social Ethics	T	2	-	-	2	-	-	2
CE 207	Python Programming Lab	LP	-	2+2#	-	-	2	-	2
<b>Total</b>			<b>17</b>	<b>10</b>	<b>1</b>	<b>17</b>	<b>5</b>	<b>1</b>	<b>23</b>
Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Oral/Pract.	Total
		Internal Assessment			End Sem Exam	Exam Duration (Hrs)			
		1	2	Average					
CE 201	Engineering Mathematics III	40	40	40	60	2	25	-	125
CE 202	Data Structures	40	40	40	60	2	25	25	150
CE 203	Computer Graphics Virtual Reality	40	40	40	60	2	25	25	150
CE 204	Digital Logic and Computer Organization and Architecture	40	40	40	60	2	25	25	150
CE 205	Paradigms and Computer Programming Fundamentals	40	40	40	60	2	-	-	100
CE 206	Human Values and Social Ethics	-	-	-	-	-	50	-	50
CE 207	Python Programming Lab	-	-	-	-	-	50	25	75
<b>Total</b>			<b>200</b>	<b>300</b>			<b>200</b>	<b>100</b>	<b>800</b>

T- Theory , L- Lab , P-Programming, C- Communication

\* Batchwise tutorial of One hour to be conducted.

# Theory class to be conducted for full class .

**Program Structure for Second Year**  
**Bachelor of Technology in Computer Engineering**  
**W.E.F. A.Y. 2022 – 23**

**Semester IV**

Course Code	Course Name	Course Component	Teaching Scheme (Contact Hours)			Credits Assigned			
			Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total
CE 208	Engineering Mathematics IV	T	3	-	1*	3	-	1	4
CE 209	Design and Analysis of Algorithms	TL	3	2	-	3	1	-	4
CE 210	Theory of Computation	T	3	-	-	3	-	-	3
CE 211	Database Management Systems	TL	3	2	-	3	1	-	4
CE 212	Operating Systems	TL	3	2	-	3	1	-	4
CE 213	Web Programming	LP	-	2+2#	-	-	2	-	2
<b>Total</b>			<b>15</b>	<b>10</b>	<b>1</b>	<b>15</b>	<b>5</b>	<b>1</b>	<b>21</b>

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Oral/Pract.	Total
		Internal Assessment			End Sem Exam	Exam Duration (Hrs)			
		1	2	Average					
CE 208	Engineering Mathematics IV	40	40	40	60	2	25	-	125
CE 209	Design and Analysis of Algorithms	40	40	40	60	2	25	25	150
CE 210	Theory of Computation	40	40	40	60	2	-	-	100
CE 211	Database Management Systems	40	40	40	60	2	25	25	150
CE 212	Operating Systems	40	40	40	60	2	25	25	150
CE 213	Web Programming	-	-	-	-	-	50	25	75
<b>Total</b>				<b>200</b>	<b>300</b>		<b>150</b>	<b>100</b>	<b>750</b>

**T- Theory , L- Lab , P-Programming, C- Communication**

**\* Batchwise tutorial of One hour to be conducted.**

**# Theory class to be conducted for full class .**

**Program Structure for Third Year**  
**Bachelor of Technology in Computer Engineering**  
**W.E.F. A.Y. 2023 – 24**

**Semester V**

Course Code	Course Name	Course Component	Teaching Scheme (Contact Hours)		Credits Assigned						
			Theory	Pract.	Theory	Pract.	Total				
CE 301	Microprocessors and Interfacing	TL	3	2	3	1	4				
CE 302	Data Communication and Networking	TL	3	2	3	1	4				
CE 303	Machine Learning	TL	3	2	3	1	4				
CE 304	Software Engineering and Agile Technology	T	3	-	3	-	3				
CE 305	Personal Financial Management	T	2	-	2	-	2				
CE 306	Professional Communication Skills II	LC	-	2+2#	-	2	2				
CE 3xx	Department Level Optional Course I (DLOC I)	T	3	-	3	-	3				
<b>Total</b>			<b>17</b>	<b>10</b>	<b>17</b>	<b>5</b>	<b>22</b>				
Course Code	Course Name	Examination Scheme									
		Theory					End Sem Exam	Exam Duration (Hrs)	Term Work	Oral/Pract.	Total
		Internal Assessment			Average						
		1	2	Average							
CE 301	Microprocessors and Interfacing	40	40	40	60	2	25	25	150		
CE 302	Data Communication and Networking	40	40	40	60	2	25	25	150		
CE 303	Machine Learning	40	40	40	60	2	25	25	150		
CE 304	Software Engineering and Agile Technology	40	40	40	60	2	-	-	100		
CE 305	Personal Financial Management	20	20	20	40	-	-	-	60		
CE 306	Professional Communication Skills II	-	-	-	-	-	50	-	50		
CE 3xx	Department Level Optional Course I (DLOC I)	40	40	40	60	2	-	-	100		
<b>Total</b>				<b>220</b>	<b>340</b>	<b>125</b>	<b>75</b>	<b>760</b>			

**T- Theory, L- Lab, P-Programming, C- Communication**  
**# Theory class to be conducted for full class .**

<b>Specializations</b> □	<b>Data Analytics and Language Processing</b>	<b>Network and Information Security</b>	<b>Computational Intelligence and Automation</b>	<b>Systems and Computing</b>
<b>Course Code</b>	CE 307	CE 308	CE 309	CE 310
<b>Department Level Optional Course I (DLOC I)</b>	Advanced Database Management System	Cryptography and System Security	IoT Systems and Applications	Advanced Operating Systems

FY 2021-22

**Program Structure for Third Year**  
**Bachelor of Technology in Computer Engineering**  
W.E.F. A.Y. 2023 – 24

**Semester VI**

Course Code	Course Name	Course Component	Teaching Scheme (Contact Hours)		Credits Assigned						
			Theory	Pract.	Theory	Pract.	Total				
CE 311	System Programming Compiler Construction	TL	3	2	3	1	4				
CE 312	Artificial Intelligence	TL	3	2	3	1	4				
CE 3xx	Department Level Optional Course II (DLOC II)	TL	3	2	3	1	4				
CE 3xx	Department Level Optional Course III (DLOC III)	TL	3	2	3	1	4				
IL 3xx	Institute Level Optional Course I (ILOC I)	T	3	-	3	-	3				
CE 391	Project A	LP	-	6	-	3	3				
<b>Total</b>			<b>15</b>	<b>14</b>	<b>15</b>	<b>7</b>	<b>22</b>				
Course Code	Course Name	Examination Scheme									
		Theory					End Sem Exam	Exam Duration (Hrs)	Term Work	Oral/ Pract.	Total
		Internal Assessment			Average	End Sem Exam					
		1	2	Average							
CE 311	System Programming Compiler Construction	40	40	40	60	2	25	25	150		
CE 312	Artificial Intelligence	40	40	40	60	2	25	25	150		
CE 3xx	Department Level Optional Course II (DLOC II)	40	40	40	60	2	25	-	125		
CE 3xx	Department Level Optional Course III (DLOC III)	40	40	40	60	2	25	-	125		
IL 3xx	Institute Level Optional Course I (ILOC I)	40	40	40	60	2	-	-	100		
CE 391	Project A	-	-	-	-	-	50	25	75		
<b>Total</b>					<b>200</b>	<b>300</b>	<b>150</b>	<b>75</b>	<b>725</b>		

T- Theory , L- Lab , P-Programming Component, C- Communication component

<b>Specializations</b> □	<b>Data Analytics and Language Processing</b>	<b>Network and Information Security</b>	<b>Computational Intelligence and Automation</b>	<b>Systems and Computing</b>
<b>Course Code</b>	CE 313	CE 314	CE 315	CE 316
<b>Department Level Optional Course II (DLOC II)</b>	Data Warehouse and Data Mining	Advanced Computer Network with S/W Defined Network	Internet of Everything	Distributed Systems

<b>Specializations</b> □	<b>Data Analytics and Language Processing</b>	<b>Network and Information Security</b>	<b>Computational Intelligence and Automation</b>	<b>Systems and Computing</b>
<b>Course Code</b>	CE 317	CE 318	CE 319	CE 320
<b>Department Level Optional Course III (DLOC III)</b>	Big Data Analytics	Mobile Computing and Communication	Robotics and its Applications	BlockChain Technology

<b>Specializations</b> □	<b>Business and Entrepreneurship</b>	<b>Bioengineering</b>	<b>Engineering Design</b>	<b>Art and Humanities</b>	<b>Applied Science</b>	<b>Life Skills, Repair, Maintenance and Safety</b>
<b>Course Code</b>	1. IL 360 2. IL 361	IL 362	IL 363	1. IL 364 2. IL 365	1. IL 366 2. IL 367	1. IL 368 2. IL 369
<b>Institute Level Optional Course I (ILOC-I)*</b>	1. Entrepreneurship 2. IPR and Patenting	Introduction to Bioengineering	Product Design	1. Visual Art 2. Journalism, Media and communication studies	1. Computational Physics 2. Polymers and Polymeric Materials	1. Vehicle Safety 2. Maintenance of Electronics Equipment

\* : Learner will select one course from any of these ILOCI verticals.



**Program Structure for Fourth Year**  
**Bachelor of Technology in Computer Engineering**

W.E.F. A.Y. 2024 – 25

**Semester VII**

Course Code	Course Name	Course Component	Teaching Scheme (Contact Hours)		Credits Assigned						
			Theory	Pract.	Theory	Pract.	Total				
CE 4xx	Department Level Optional Course IV (DLOC IV)	TL	3	2	3	1	4				
CE 4xx	Department Level Optional Course V (DLOC V)	TL	3	2	3	1	4				
CE 4xx	Department Level Optional Course VI (DLOC VI)	TL	3	2	3	1	4				
IL 4xx	Institute Level Optional Course II (ILOC II)	T	3	-	3	-	3				
CE 497	Project B	LP	-	10	-	5	5				
<b>Total</b>			<b>12</b>	<b>16</b>	<b>12</b>	<b>8</b>	<b>20</b>				
Course Code	Course Name	Examination Scheme									
		Theory					End Sem Exam	Exam Duration (Hrs)	Term Work	Oral/ Pract.	Total
		Internal Assessment			Average						
		1	2								
CE 4xx	Department Level Optional Course IV (DLOC IV)	40	40	40	60	2	25	25	150		
CE 4xx	Department Level Optional Course V (DLOC V)	40	40	40	60	2	25	25	150		
CE 4xx	Department Level Optional Course VI (DLOC VI)	40	40	40	60	2	25	25	150		
IL 4xx	Institute Level Optional Course II (ILOC II)	40	40	40	60	2	-	-	100		
CE 497	Project B	-	-	-	-	-	100	50	150		
<b>Total</b>				<b>160</b>	<b>240</b>		<b>125</b>	<b>125</b>	<b>700</b>		

T- Theory , L- Lab , P-Programming, C- Communication

<b>Specializations</b> □	<b>Data Analytics and Language Processing</b>	<b>Network and Information Security</b>	<b>Computational Intelligence and Automation</b>	<b>Systems and Computing</b>
<b>Course Code</b>	CE 401	CE 402	CE 403	CE 404
<b>Department Level Optional Course IV (DLOC IV)</b>	Data Science	Information and Cloud Security	Digital Image Processing	Human Computer Interaction

<b>Specializations</b> □	<b>Data Analytics and Language Processing</b>	<b>Network and Information Security</b>	<b>Computational Intelligence and Automation</b>	<b>Systems and Computing</b>
<b>Course Code</b>	CE 405	CE 406	CE 407	CE 408
<b>Department Level Optional Course V (DLOC V)</b>	Natural Language Processing	Ethical Hacking and Digital Forensics	Deep Learning	User Experience Design

<b>Specializations</b> □	<b>Data Analytics and Language Processing</b>	<b>Network and Information Security</b>	<b>Computational Intelligence and Automation</b>	<b>Systems and Computing</b>
<b>Course Code</b>	CE 410	CE 411	CE 412	CE 413
<b>Department Level Optional Course VI (DLOC VI)</b>	Social Media Analytics	Cyber Security and Laws	Computer Vision	High Performance Computing

<b>Specializations</b> □	<b>Business and Entrepreneurship</b>	<b>Bioengineering</b>	<b>Engineering Design</b>	<b>Art and Humanities</b>	<b>Applied Science</b>	<b>Life Skills, Repair, Maintenance and Safety</b>
<b>Course Code</b>	1. IL 470 2. IL 471	IL 472	IL 473	IL 474	IL 475	1. IL 476 2. IL 477
<b>Institute Level Optional Course II (ILOC II)*</b>	1. E-Commerce and E-Business 2. Business analytics	Biomedical Instrumentation	<b>Design for sustainability</b>	<b>Political Science</b>	Research Methodology	1. <b>Maintenance of Mechanical Equipment</b> 2. Cooking and Nutrition

\* : Learner will select one course from any of these ILOC verticals.

**Program Structure for Fourth Year**  
**Bachelor of Technology in Computer Engineering**  
**W.E.F. A.Y. 2024 – 25**

**Semester VIII**

Course Code	Course Name	Course Component	Teaching Scheme (Contact Hours)		Credits Assigned		
			Theory	Pract.	Theory	Pract.	Total
IL 4xx	Institute Level Optional Course III (ILOC III)	T	3	-	3	-	3
CE 498	Project C	LP	-	6	-	3	3
CE 499	Industry Internship	PC	-	16	-	8	8
<b>Total</b>			-	22	3	11	14

Course Code	Course Name	Examination Scheme									
		Theory					End Sem Exam	Exam Duration (Hrs)	Term Work	Oral/ Pract.	Total
		Internal Assessment			Average	Exam Duration (Hrs)					
		1	2	Average			End Sem Exam	Exam Duration (Hrs)	Term Work	Oral/ Pract.	Total
IL 4xx	Institute Level Optional Course III (ILOC III)	40	40	40	60	2	-	100	100		
CE 498	Project C	-	-	-	-	-	50	25	75		
CE 499	Industry Internship	-	-	-	-	-	100	100	200		
<b>Total</b>							150	125	375		

T- Theory , L- Lab , P-Programming, C- Communication

Specializations <input type="checkbox"/>	Business and Entrepreneurship	Bioengineering	Engineering Design	Art and Humanities	Applied Science	Life Skills, Repair, Maintenance and Safety
Course Code	IL 480	IL 481	IL 482	IL 483	IL 484	1. IL 485 2. IL 486
Institute Level Optional Course III (ILOC III)*	Digital Business Management and Digital Marketing	Medical Image Processing	Technologies for Rural Development	Economics	GIS and Remote Sensing	1. Physical Education 2. Environmental Management

\* : Learner will select one course from any of these ILOC verticals.