

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 2023-24**

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

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

**Third Year** - Effective from Academic Year **2025-26**

**Fourth Year** - Effective from Academic Year **2026-27**

*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 168 credit course which comprises core courses and elective courses. The department level elective courses are distributed over 4 specializations. The specializations are:

1. Artificial Intelligence and Data Science
2. Cloud and Cyber Security
3. Computational Intelligence and Automation.
4. Human Computer Interaction.

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	10
Basic Science courses	28
Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc	
Professional core courses	51
Professional Elective courses relevant to chosen specialization/branch	24
Open subjects – Electives from other technical and /or emerging subjects	14
Project work, seminar and internship in industry or elsewhere	18
Mandatory Courses - Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge	23
<b>Total Credits</b>	<b>168</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. Deepti Lawand	Member



**Program Structure for First Year**  
**Bachelor of Technology in Computer Engineering**  
**W.E.F. A.Y. 2023-24**  
**Semester I**

Course Code	Course Name	Category	Teaching Scheme (Contact Hours)		Credits Assigned				
			Theory	Pract.	Theory	Pract.	Total		
CE101	Engineering Mathematics I	BSC	3	2	3	1	4		
CE102	Engineering Physics I	BSC	2	1	2	0.5	2.5		
CE103	Engineering Chemistry I	BSC	2	1	2	0.5	2.5		
CE104	C Programming	ESC	3	2	3	1	4		
CE105	Basic Electrical Engineering*	ESC	3	-	3	-	3		
CE106	Basic Workshop Practice-I and BEE lab	VSEC	-	2+2\$	-	2	2		
CE107	Indian Knowledge System	HSSM	-	2+2#	-	2	2		
CE108	Co-curricular Courses	CC	-	2+2#	-	2	2		
Total			13	18	13	9	22		
Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Oral/ Pract.	Total
		Internal Assessment			End Sem Exam	Exam Duration (Hrs)			
		1	2	Average					
CE101	Engineering Mathematics I	40	40	40	60	2	25	-	125
CE102	Engineering Physics I	30	30	30	45	2	25	-	100
CE103	Engineering Chemistry I	30	30	30	45	2	25	-	100
CE104	C Programming	40	40	40	60	2	25	25	150
CE105	Basic Electrical Engineering*	40	40	40	60	2	-	-	100
CE106	Basic Workshop Practice-I and BEE lab	-	-	-	-	-	50+ 25\$	25\$	100
CE107	Indian Knowledge System	-	-	-	-	-	50	-	50
CE108	Co-curricular Courses	-	-	-	-	-	50	-	50
Total									775

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

\$- BEE lab is a part of VSEC course and Termwork and viva marks of BEE should be considered under credit of VSEC

**Program Structure for First Year**  
**Bachelor of Technology in Computer Engineering**  
**W.E.F. A.Y. 2023-24**  
**Semester II**

Course Code	Course Name	Category	Teaching Scheme (Contact Hours)		Credits Assigned				
			Theory	Pract.	Theory	Pract.	Total		
CE109	Engineering Mathematics II	BSC	3	2	3	1	4		
CE110	Engineering Physics II	BSC	2	1	2	0.5	2.5		
CE111	Engineering Chemistry II	BSC	2	1	2	0.5	2.5		
CE112	Engineering Mechanics and Graphics*	ESC	3	-	3	-	3		
CE113	Java Programming	PCC	3	2	3	1	4		
CE114	Professional Communication ethics	AEC	-	2+2#	-	2	2		
CE115	Basic Workshop Practice-II and EMG lab	VSEC	-	2+2\$	-	2	2		
CE116	Co-curricular Courses	Liberal Learning	-	2+2#	-	2	2		
Total			12	20	12	10	22		
Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Oral / Pract.	Total
		Internal Assessment			End Sem Exam	Exam Duration (Hrs)			
		1	2	Average					
CE109	Engineering Mathematics II	40	40	40	60	2	25	-	125
CE110	Engineering Physics II	30	30	30	45	2	25	-	100
CE111	Engineering Chemistry II	30	30	30	45	2	25	-	100
CE112	Engineering Mechanics and Graphics*	40	40	40	60	2	-	-	100
CE113	Java Programming	40	40	40	60	2	25	25	150
CE114	Professional Communication ethics	20	20	20	30	1	25	-	75
CE115	Basic Workshop Practice-II and EMG lab	-	-	-	-	-	50+25\$	25\$	100
CE116	Co-curricular Courses	-		-	-	-	50	-	50
Total									800

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

\$- EMG lab is a part of VSEC course and Termwork and viva marks of EMG should be considered under credit of VSEC .

**Program Structure for Second Year**  
**Bachelor of Technology in Computer Engineering**  
**W.E.F. A.Y. 2024-25**  
**Semester III**

Course Code	Course Name	Category	Teaching Scheme (Contact Hours)			Credits Assigned			
			Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total
CE 201	Engineering Mathematics III	OE	3	-	1*	3	-	1	4
CE 202	Data structure	PCC	3	2	-	3	1	-	4
CE 203	Database Management Systems	PCC	3	2	-	3	1	-	4
CE 204	Digital Logic and Computer Architecture	MD M	3	-	-	3	-	-	3
CE 205	Personal Financial Management	VEC	2	-	-	2	-	-	2
CE 206	Professional Communication Skills II	HSSM	-	2+2#	-	-	2	-	2
CE 207	Python Programming Lab	CEP	-	2+2#	-	-	2	-	2
Total									21
Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Oral/ Pract.	Total
		Internal Assessment		Average	End Sem Exam	Exam Duration (Hrs)			
		1	2						
CE 201	Engineering Mathematics III	40	40	40	60	2	25	-	125
CE 202	Data structure	40	40	40	60	2	25	25	150
CE 203	Database Management Systems	40	40	40	60	2	25	25	150
CE 204	Digital Logic and Computer Architecture	40	40	40	60	2	-	-	100
CE 205	Personal Financial Management	30	30	30	45	2	-	-	75
CE 206	Professional Communication Skills II	-	-	-	-	-	50	-	50
CE 207	Python Programming Lab	-		-	-	-	50	25	75
Total			-	190	285	-	175	75	725

\* 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. 2024-25**

**Semester IV**

Course Code	Course Name	Category	Teaching Scheme (Contact Hours)			Credits Assigned			
			Theor y	Pract.	Tut.	Theory	Pract.	Tut.	Total
CE 208	Engineering Mathematics IV	MD M	3	-	1*	3	-	1	4
CE 209	Design and Analysis of Algorithms	PCC	3	2	-	3	1	-	4
CE 210	Operating Systems	PCC	3	2	-	3	1	-	4
CE 211	Computer Graphics and virtual reality	AEC	3	-	-	3	-	-	3
CE 212	Entrepreneurship	<i>HSSM</i>	2	-	-	-	-	-	2
CE 213	Web Programming	<i>VSEC</i>	-	2+2#	-	-	2	-	2
CE 214	Human Values and Social Ethics	<i>VEC</i>	2	-	-	2	-	-	2
Total									21
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	Operating Systems	40	40	40	60	2	25	25	150
CE 211	Computer Graphics and virtual reality	40	40	40	60	2	-	-	100
CE 212	Entrepreneurship	30	30	30	45	2	-	-	75
CE 213	Web Programming	-	-	-	-	-	50	25	75
CE 214	Human Values and Social Ethics	-	-	-	-	-	50	-	50
Total				190	285	-	175	75	725

\* 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. 2025-26**  
**Semester V**

Course Code	Course Name	Category	Teaching Scheme (Contact Hours)			Credits Assigned			
			Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total
CE 301	Theory of Computation	PCC	3	–	–	3	–	–	3
CE 302	Machine Learning	PCC	3	2	–	3	1	–	4
CE 303	Microprocessor	MD M	3	–	–	3	–	–	3
CE 304	Computer Network	PC	3	2	–	3	1	–	4
CE 3xx	Department Level Optional Course I	PEC	3	2	–	3	1	–	4
CE 305	ILOC-I	MC	3	–	–	3	–	–	3
Total									21
Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Oral/ Pract.	Total
		Internal Assessment			End Sem Exam	Exam Duration (Hrs)			
		1	2	Average					
CE 301	Theory of Computation	40	40	40	60	2	–	–	100
CE 302	Machine Learning	40	40	40	60	2	25	25	150
CE 303	Microprocessor	40	40	40	60	2	–	–	100
CE 304	Computer Network	40	40	40	60	2	25	25	150
CE 3xx	Department Level Optional Course I	40	40	40	60	2	25	25	150
CE 35X	ILOC-I	40	40	40	60	2	–	–	100
Total				240	360		75	75	750

\* Batchwise tutorial of One hour to be conducted.

# Theory class to be conducted for full class .

Specializations <input type="checkbox"/>	Artificial Intelligence and Data Science	Cloud and Cyber Security	Robotics and Automation	Human Computer Interaction
Course Code	CE 305	CE 306	CE 307	CE 308
Department Level Optional Course I (DLOC I)	Advanced Database management System	Cryptography and Network Security	IoT Systems and Applications	Augmented Reality and Virtual Reality

<b>Specializations</b> <input type="checkbox"/>	<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. IL350	IL 352	IL 353	1. IL 354	1. IL 356	1. IL 358
<b>Institute Level Optional Course I (ILOC-I)*</b>	IPR and Patenting	Introduction to Bioengineering	Product Design	Visual Art	Computational Physics	Vehicle Safety

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

**Program Structure for Third Year**  
**Bachelor of Technology in Computer Engineering**  
**W.E.F. A.Y. 2025-26**  
**Semester VI**

Course Code	Course Name	Category	Teaching Scheme (Contact Hours)		Credits Assigned				
			Theory	Pract.	Theory	Pract.	Total		
CE 309	System Programming Compiler Construction	PCC	3	2	3	1	4		
CE 310	Software Engineering and Project Management	PCC	3	2	3	1	4		
CE 3xx	Department Level Optional Course- II	PEC	3	2	3	1	4		
CE 3xx	Department Level Optional Course- III	PEC	3	2	3	1	4		
IL 36X	Institute Level Optional Course- II	MC	2	1	3	-	3		
CE 391	Project A	SC		4	—	2	2		
Total							21		
Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Oral/ Pract.	Total
		Internal Assessment			End Sem Exam	Exam Duration (Hrs)			
		1	2	Average					
CE 309	System Programming Compiler Construction	40	40	40	60	2	25	25	150
CE 310	Software Engineering and Project Management	40	40	40	60	2	25	25	150
CE 3xx	Department Level Optional Course II	40	40	40	60	2	25	25	150
CE 3xx	Department Level Optional Course III	40	40	40	60	2	25	25	150
IL 36X	Institute Level Optional Course II	40	40	40	60	2	—	—	100
CE 391	Project A						25	25	50
Total				200	300		125	150	750



<b>Specializations</b> □	<b>Artificial Intelligence and Data Science</b>	<b>Cloud and Cyber Security</b>	<b>Robotics and Automation</b>	<b>Human Computer Interaction</b>
<b>Course Code</b>	CE 311	CE 312	CE 313	CE 314
<b>Department Level Optional Course II (DLOC II)</b>	Data Warehouse and Data Mining	Ethical Hacking and Cyber Laws	Robotics and its Applications	Human Computer Interaction

<b>Specializations</b> □	<b>Artificial Intelligence and Data Science</b>	<b>Cloud and Cyber Security</b>	<b>Robotics and Automation</b>	<b>Human Computer Interaction</b>
<b>Course Code</b>	CE 315	CE 316	CE 317	CE 318
<b>Department Level Optional Course III (DLOC III)</b>	Big Data Analysis	Advance System security	Internet of Everything	User Experience Design

<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	IL 362	IL 363	IL 364	IL 365	1. IL 366
<b>Institute Level Optional Course II (ILOC II)*</b>	e- Commerce and e-Business	Medical Image Processing	Technologies for Rural Development	Economics	GIS and Remote Sensing	Maintenance of Electronics and Mechanical Equipment

**\* : 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. 2026-27**

**Semester VII**

Course Code	Course Name	Category	Teaching Scheme (Contact Hours)		Credits Assigned				
			Theo ry	Pract.	Theory	Pract.	Total		
CE 401	Artificial Intelligence	PCC	3	2	3	1	4		
CE 402	Parallel and Distributed Systems	PCC	3	2	3	1	4		
CE 4xx	Department Level Optional Course IV	PEC	3	2	3	1	4		
CE 4xx	Department Level Optional Course V	PEC	3	2	3	1	4		
CE 491	Project B	Experiential Learning Courses	-	8	-	4	4		
Total							20		
Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Oral / Pract.	Total
		Internal Assessment			End Sem Exam	Exam Durat ion (Hrs)			
		1	2	Average					
CE 401	Artificial Intelligence	40	40	40	60	2	25	25	150
CE 402	Parallel and Distributed Systems	40	40	40	60	2	25	25	150
CE 4xx	Department Level Optional Course IV	40	40	40	60	2	25	25	150
CE 4xx	Department Level Optional Course V	40	40	40	60	2	25	25	150
CE 491	Project B						25	25	50
Total				160	240		125	125	650

<b>Specializations</b> □	<b>Artificial Intelligence and Data Science</b>	<b>Cloud and Cyber Security</b>	<b>Robotics and Automation</b>	<b>Human Computer Interaction</b>
<b>Course Code</b>	CE 403	CE 404	CE 405	CE 406
<b>Department Level Optional Course IV (DLOC IV)</b>	Natural Language Processing	Network and Cloud security	Digital Image Processing	Usability Engineering

<b>Specializations</b> □	<b>Artificial Intelligence and Data Science</b>	<b>Cloud and Cyber Security</b>	<b>Robotics and Automation</b>	<b>Human Computer Interaction</b>
<b>Course Code</b>	CE 407	CE 408	CE 409	CE 410
<b>Department Level Optional Course V (DLOC V)</b>	Data Science	Penetration and vulnerability Assessment	Deep Learning	Mobile and Ubiquitous Computing:

**Program Structure for Fourth Year**  
**Bachelor of Technology in Computer Engineering**  
**W.E.F. A.Y. 2026-27**

**Semester VIII**

Course Code	Course Name	Course Component	Teaching Scheme (Contact Hours)		Credits Assigned				
			Theory	Pract.	Theory	Pract.	Total		
CE 411	Software Testing and Quality Assurance	PCC	3	2	3	1	4		
CE 4xx	Department Level Optional Course VI	PEC	3	2	3	1	4		
CE 493	Internship/ OJT	Experiential Learning Courses	-	16		8	8		
CE 494	Project C		-	8		4	4		
Total			6	28	6	14	20		
Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Oral/ Pract.	Total
		Internal Assessment			End Sem Exam	Exam Duration (Hrs)			
		1	2	Average					
CE 411	Software Testing and Quality Assurance	40	40	40	60	2	25	25	150
CE 4xx	Department Level Optional Course VI	40	40	40	60	2	25	25	150
CE 493	Internship/ OJT	-	-	-	-	-	100	100	200
CE 494	Project C						50	50	100
Total				80	120		200	200	600

Specializations <input type="checkbox"/>	Artificial Intelligence and Data Science	Cloud and Cyber Security	Robotics and Automation	Human Computer Interaction
Course Code	CE 412	CE 413	CE 414	CE 415
Department Level Optional Course VI (DLOC VI)	Social Media Analytics	Digital Forensics	Computer Vision	Social Computing and Collaboration: