Mahatma Education Society's

Pillai University

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

School of Engineering

Syllabus

of

M. Tech. in Computer Engineering

for

The Admission Batch of AY 2026-27

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

Second Year - Effective from Academic Year **2027-28**

as per

Choice Based Credit and Grading System

Mahatma Education Society's

Pillai School of Engineering

Vision

Pillai School of Engineering 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:

Knowledge and Attitude Profile (WK)

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost,re- use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9: Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

Program Outcomes:

Engineering Graduates will be able to:

1. Engineering knowledge:
   Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
2. Problem analysis:
   Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
3. Design/development of solutions:
   Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
4. Conduct investigations of complex problems:
   Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
5. Engineering Tool Usage:

Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

6. The engineer and The World:
   Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
7. Ethics:
   Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
8. Individual and Collaborative Team work:
   Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
9. Communication:
   Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
10. Project management and finance:
    Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
11. Life-long learning:
    Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

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 postgraduates 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 level.

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 C1, C2, C3, C4 and C5 and learners grade points in these courses are G1, G2, G3, G4 and G5 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,

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

The Department of Computer Engineering offers a M. Tech. programme in Computer Engineering. This is a four semester course. The complete course is a **80 credit** course which comprises core courses and department level elective courses. There are 3 department level optional course choices for semester I and II separately. The students have to select one course from each DLOC course list.

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 **M.Tech Computer Engineering** syllabus effective from the Academic Year 2026-27 . 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.Nilesh Marathe	Subject experts from otherUniversities
3	Dr. Dipti Durgesh Patil	Subject experts from otherUniversities
4	Mr.Nikhil Mahadeshwar,	Industry Expert nominated by Dean
5	Mr. Akash Deshmukh	Alumni employed in industry
6	Dr. Gayatri Hegde	Expert from an interdisciplinary or allied field
7	Dr. Jyoti Deshmukh	Senior faculty of the department
8	Dr.Dhiraj Amin	Senior faculty of the department

Program Structure for
Master of Technology in Computer Engineering
Semester I

W.e.f. A.Y 2026-27

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theory	Pract	Theory	Practical	Total
CE500	System Design	04	--	04	--	04
COMM501	Business Communication and Intellectual Property Rights	04	--	04	--	04
CE 50x	Department Level Optional Course-I	03	--	03	--	03
CE 50x	Department Level Optional Course-II	03	--	03	--	03
CE 50x	Department Level Optional Course-III	03	--	03	--	03
CE510	Computer DLOC Lab-I	--	02	--	01	01
ENGG597	Dissertation-I/NPTEL Course on Research Writing	--	04	--	02	02
TOTAL		**17**	**06**	**17**	**03**	**20**

Course Code	Course Name	Examination Scheme							
		Theory							
		Internal Assessment			End Sem Exam	Exam Duration (Hrs)	Term Work	Oral /Practs	Total
		Test 1	Test 2	Avg					
CE500	System Design	40	40	40	60	2	-	-	100
COMM501	Business Communication and Intellectual Property Rights	40	40	40	60	2	-	-	100
CE 50x	Department Level Optional Course-I	40	40	40	60	2	-	-	100
CE 50x	Department Level Optional Course-II	40	40	40	60	2	-	-	100
CE 50x	Department Level Optional Course-III	40	40	40	60	2	-	-	100
CE510	Computer DLOC Lab-I	--	--	--	--	--	50	25	75
ENGG597	Dissertation-I/NPTEL Course on Research Writing	--	--	--	--	--	50	25	75
TOTAL		**200**	**200**	**200**	**300**	**15**	**100**	**50**	**650**

Department Level Optional Courses :

Every student is required to take 3 Department Elective Courses for Semester I. Different sets of courses will run in both the semesters. Students can take these courses from the list of department electives, which are closely allied to their disciplines.

Sr No	Department Level Optional Course-I	Department Level Optional Course-II	Department Level Optional Course-III
1	CE 501 Advanced Big Data Analytics	**CE 504 Multimedia Forensics**	CE 507 User experience Design
2	**CE 502 Cyber Threat Intelligence**	CE 505 Competitive Programming	CE 508 Industrial IoT
3	CE 503 Computer Vision and Image Understanding	CE 506 Deep Learning	**CE 509 Agentic AI**

Program Structure for

Master of Technology in Computer Engineering
Semester II

W.e.f. A.Y 2026-27

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theory	Pract	Theory	Pract	Total
CE 511	Scalable Computing and Systems	04	--	04	--	04
CE 512	Research Methodology	04	--	04	--	04
CE 51X	Department Level Optional Course-IV	03	--	03	--	03
CE 51X	Department Level Optional Course-V	03	--	03	--	03
CE 51X	Department Level Optional Course-VI	03	--	03	--	03
CE 522	Computer DLOC Lab-II	--	02	--	01	01
ENGG 598	Dissertation-II	--	04	--	02	02
TOTAL		**17**	**06**	**17**	**03**	**20**

Course Code	Course Name	Examination Scheme							
		Theory							
		Internal Assessment			End Sem Exam	Exam Duration (Hrs)	Term Work	Pract/ Oral	Total
		Test 1	Test 2	Avg					
CE 511	Scalable Computing and Systems	40	40	40	60	2	--	--	100
CE 512	Research Methodology	40	40	40	60	2	--	--	100
CE 51X	Department Level Optional Course-IV	40	40	40	60	2	--	--	100
CE 51X	Department Level Optional Course-V	40	40	40	60	2	--	--	100
CE 51X	Department Level Optional Course-VI	40	40	40	60	2	--	--	100
CE 522	Computer DLOC Lab-II	--	--	--	--	--	50	25	75
ENGG 598	Dissertation-II	--	--	--	--	--	50	25	75

TOTAL	**200**	**200**	**200**	**300**	**15**	**100**	**50**	**650**

Department Level Optional Course :

Every student is required to take 3 Department Elective Courses for Semester II. Different sets of courses will run in both the semesters. Students can take these courses from the list of department electives, which are closely allied to their disciplines.

Sr. No	Department Level Optional Course-IV	Department Level Optional Course-V	Department Level Optional Course-VI
1	CE 513 Quantum Computing	CE 516 Multimodal AI Systems	CE 519 Cyber Physical Systems and Digital Twin Technology
2	CE 514 Blockchain and Bitcoin Fundamentals	CE 517 AI in Healthcare	CE 520 Cognitive Robotics
3	CE 515 Generative and Explainable AI	CE 518 Reinforcement Learning	CE 521 Applied Data Science

Program Structure for
Master of Technology in Computer Engineering

Semester III

W.e.f. A.Y 2027-28

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theory	Pract	Theory	Pract	Total
CE 523	Responsible AI and AI Governance	02	-	02	-	02
ENGG695	Internship / Relevant Certification	-	06	-	03	03
ENGG697	Dissertation-III	-	30	-	15	15
TOTAL		02	36	-	18	**20**

Course Code	Course Name	Examination Scheme							
		Theory							
		Internal Assessment			End Sem Exam	Exam Duration (Hrs)	Term Work	Pract/Oral	Total
		Test1	Test 2	Avg					
CE 523	Responsible AI and AI Governance	20	20	20	30	02	-	-	50
ENGG695	Internship / Relevant Certification	-	-	-	-	-	50	50	100
ENGG697	Dissertation-III	-	-	-	-	-	150	100	250
TOTAL		-	-	20	30	-	200	150	400

Program Structure for

Master of Technology in Computer Engineering
Semester IV

W.e.f. A.Y 2027-28

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theory	Pract	Theory	Pract	Total
ENGG698	Dissertation-IV	-	40	-	20	20
		-	40	-	20	**20**

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract/ Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (Hrs)			
		Test1	Test 2	Avg					
ENGG698	Dissertation-IV	-	-	-	-	-	200	100	300
TOTAL		-	-	-	-	-	200	100	300