



MARATHA VIDYA PRASARAK SAMAJ'S
KARMAVEER ADV. BABURAO GANPATRAO THAKARE
COLLEGE OF ENGINEERING



Permanently Affiliated to Savitribai Phule Pune University Vide Letter No: CA/1542
 & Approved by AICTE New Delhi Vide Letter No: 740-89-32 (E) ET/98
 AISHE Code - C-41622

www.kbtcoe.org

Department of Computer Engineering
Syllabus Pattern (2015)

Department Vision

To be the centre for excellence for training the world-class engineers to work with multidisciplinary domain based on the state-of-the-art of technology enabled academic system blended with industrial and business practices.

Department Mission

To educate and train undergraduate students in Computer Engineering by instilling excellence to fulfil professional and social requirements in business and industry on the platform of scientifically designed academic processes.

Program Educational Objectives

1. To inculcate computational and programming skills in the field of Computer Engineering.
2. To prepare the graduates to fulfil professional requirements in industry.
3. To motivate students to solve problems related to society

Program Outcomes

PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	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.
PO3	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.
PO4	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.

PO5	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.
PO6	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.
PO7	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.
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	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.
PO11	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.
PO12	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

PSO1	To demonstrate mathematical and Computer Engineering fundamentals.
PSO2	To adapt modern computer tools and technologies to solve Computer Engineering Problems
PSO3	To apply software engineering practices and standards for software development and project management

Course Outcomes

(As per the Syllabus of 2015 Pattern)

SE Semester I

Subject Code : 210241 Subject Name: Discrete Mathematics	
C201.1	Solve problems by applying set theory, propositional logic and formal proof techniques.

C201.2	Illustrate problems logically by using function and relation models.
C201.3	Analyze numbers of possible outcomes using permutations and combinations
C201.4	Solve computing problems using appropriate graph algorithms.
C201.5	Solve computing problems using appropriate tree algorithms.
C201.6	Evaluate algebraic structures and coding theory
Subject Code : 210242 Subject Name: Digital electronics and logic design	
C202.1	Design combinational digital circuits.
C202.2	Design sequential digital circuits.
C202.3	Design simple digital system using ASM and VHDL.
C202.4	Design combinational circuits using PLDs.
C202.5	Apply the knowledge of logic families to design digital system.
C202.6	Explain 8051 Microcontroller system.
Subject Code : 210243 Subject Name: Data Structures and Algorithm	
C203.1	Select the algorithm design strategies and data structures for programming problems
C203.2	Discriminate sequential data structures to store and process data in problem solving

C203.3	Apply linked list data structure for solving problems
C203.4	Solve problems using stack data structure
C203.5	Apply queue data structure to solve problems
C203.6	Use appropriate searching and sorting technique for better efficiency
Subject Code : 210244 Subject Name: Computer Organization and Architecture	
C204.1	Explain Computer Architecture concepts related to structure, function and characteristics of computer systems
C204.2	Describe computer architecture concepts related to computer memories.
C204.3	Describe concepts related to I/O devices and their methods.
C204.4	Illustrate instruction set of processor and their addressing modes.
C204.5	Explain the principles of computer architecture for commercially available computers.
C204.6	Discuss concepts related to control Unit.
Subject Code : 210245 Subject Name: Object Oriented Programming (OOP)	
C205.1	Apply the principles of Object Oriented Programming (OOP) in C++
C205.2	Apply OOP concepts of Polymorphism and Inheritance
C205.3	Apply virtual functions in programming situations

C205.4	Write programming applications using templates and exception handling
C205.5	Illustrate basic concepts of files and streams for data handling
C205.6	Apply Standard Template Library (STL) to simplify applicability of OOP
Subject Code : 210246 Subject Name: DELD Lab	
C206.1	Design and implement combinational circuit using different types of gates.
C206.2	Design and implement sequential digital circuits using Flip-flops.
C206.3	Design combinational and sequential circuits using different modelling styles of VHDL.
C206.4	Write the functionalities, properties and applicability of logic families and Microcontroller.
Subject Code : 210247 Subject Name: Data Structures Lab	
C207.1	Write programs for linear data structures using arrays and linked list.
C207.2	Develop real time applications using Stack and Queue
C207.3	Write programs using searching and sorting techniques.
Subject Code : 210248 Subject Name: Object Oriented Programming Lab	
C208.1	Write programs using basic OOP concepts and polymorphism for application development
C208.2	Write programs for file handling and exception handling

C208.3	Write programs using templates and STL.
Subject Code : 210249 Subject Name: Soft Skills	
C209.1	Demonstrate verbal/oral communication and listening skills
C209.2	Write precise briefs or reports and technical documents.
C209.3	Demonstrate skills in group discussion / meetings / interviews and deliver presentations.
C209.4	Explore goal/target setting, self-motivation and practicing creative thinking
Subject Code : 210250 Subject Name: Audit Course -I	
C210.1	Discuss rules and regulations of Road Safety
C210.2	Explain causes & remedies of road accidents

SE Semester II

Subject Code : 207003 Subject Name: Engineering Mathematics -III	
C211.1	Solve higher order linear differential equations.
C211.2	Solve problems related to Fourier transform, Z –Transform to solve difference equation.
C211.3	Apply statistics methods like correlation, regression analysis in analyzing, interpreting experimental data.

C211.4	Apply Probability Distribution like binomial, Poisson, Normal for testing the given data.
C211.5	Use Vector differentiation and Integration to solve vector fields and apply to compute Line Surface and volume integrals.
C211.6	Use Complex differentiation to check analytic function and perform contour integration by using complex integration.

Subject Code : 210251 Subject Name: Computer Graphics

C212.1	Apply mathematics to develop computer programs for elementary graphics operations
C212.2	Apply the concepts of windowing and clipping algorithms to fill and clip polygons.
C212.3	Apply the core concepts of computer graphics, including transformation in two and three dimensions.
C212.4	Explain the concept of segment, animation and colour models .
C212.5	Describe methods and techniques for shading, illumination and lighting
C212.6	Develop the applications using the concepts of Curves and Fractals

Subject Code : 210252 Subject Name: Advanced Data Structures

C213.1	Use tree data structure algorithms for solving problems
C213.2	Use graph data structure algorithms for solving problems
C213.3	Apply hashing technique for implementing data structures
C213.4	Explain OBST and AVL search trees

C213.5	Use efficient indexing methods and multiway search techniques to store and maintain data.
C213.6	Explain methods of file organization
Subject Code : 210253 Subject Name: Microprocessor	
C214.1	Use Assembly Language Programming to develop application.
C214.2	Explain system architecture and memory management
C214.3	Describe architectural concepts like Protection and Multitasking in processor
C214.4	Identify working of Input-Output, Exceptions and Interrupts in 80386DX
C214.5	Explain initialization of 80386DX, debugging and virtual 8086 Mode
C214.6	Describe concepts of 80386DX Signals, Bus Cycles and 80387 Coprocessor.
Subject Code : 210254 Subject Name: Principles of Programming Languages	
C215.1	Explain the strengths and weaknesses of programming languages for effective and efficient program development
C215.2	Discuss the principles underlying the programming languages
C215.3	Explain structuring of program and programming paradigms
C215.4	Apply fundamental concepts in the object oriented programming using Java
C215.5	Apply inheritance, polymorphism and encapsulation in Java

C215.6	Use exception handling and manage IO in Java
Subject Code : 210255 Subject Name: Computer Graphics Lab	
C216.1	Write programs using object oriented programming for elementary graphic operations.
C216.2	Write programs using transformations, curves and fractals for application development
Subject Code : 210256 Subject Name: Advanced Data Structures Lab	
C217.1	Solve problems using trees and graphs algorithms
C217.2	Write programs for searching and sorting
Subject Code : 210257 Subject Name: Microprocessor Lab	
C218.1	Apply addressing modes and 64 bit instruction set to implement assembly language programs
C218.2	Apply logic for processor mode of operation
C18.3	Write 80387 NDP assembly language program
Subject Code : 210258 Subject Name: Audit Course -II	
C219.1	Describe the fundamental legal principles related to confidential information, copyright, patents, designs, trademarks and unfair competition
C219.2	Identify principles of law relating to intellectual property

TE Semester I

Subject Code : 310241		Subject Name: Theory of Computation
C301.1	Construct deterministic and nondeterministic finite automata.	
C301.2	Write regular expressions	
C301.3	Design context free grammar.	
C301.4	Design Turing machine.	
C301.5	Construct deterministic and nondeterministic Pushdown automata.	
C301.6	Describe the basic concepts of computation such as decidability, reducibility, complexity theory, intractable problems.	
Subject Code : 310242		Subject: Database Management Systems
C302.1	Design E-R Model for given requirements and convert the same into database tables.	
C302.2	Identify systematic database design approaches covering Relational Database Design.	
C302.3	Use database techniques SQL & PL/SQL.	
C302.4	Illustrate transaction management in relational database System.	
C302.5	Differentiate different database architecture for real time environment.	
C302.6	Apply advanced NOSQL database programming concepts and techniques to solve the queries.	

Subject Code : 310243 Subject: Software Engineering and Project Management

C303.1	Identify software process models for developing a software project
C303.2	Analyze software requirements of various domains
C303.3	Apply quality attributes in software development life cycle.
C303.4	Analyze basics of IT Project management.
C303.5	Identify Risk Management, Configuration Management, Maintenance & Reengineering in project management.
C303.6	Discuss software testing approaches for software verification and validation

Subject Code : 310244 Subject: Information Systems and Engineering Economics

C304.1	Describe the basic knowledge of an Information System.
C304.2	Classify managerial issues relating to management information systems
C304.3	Discuss Information System solutions for E-governance
C304.4	Explain the concept of money management
C304.5	Evaluate present worth, future worth and annual worth analysis of economic domain
C304.6	Recognize cash flow analysis and taxes

Subject Code : 310245 Subject: Computer Networks

C305.1	Discuss the OSI model and its layer responsibilities in detail
C305.2	Determine design issue, flow control and error control
C305.3	Illustrate the channel allocation protocol
C305.4	Demonstrate different routing and switching algorithms for network layer
C305.5	Analyze data flow between TCP/IP model using Transport layer
C305.6	Illustrate Client-Server architectures and prototypes by the means of correct standards and technology at application layer
Subject Code : 310246 Subject Name: SDL	
C306.1	Apply concepts of advance java/android/python/R-programming
C306.2	Construct software solutions for building applications and particular problem
Subject Code : 310247 Subject Name: DBMS LAB	
C307.1	Develop the ability to handle databases of varying complexities
C307.2	Use advanced database Programming concepts
Subject Code : 310248 Subject Name: CN LAB	
C308.1	Demonstrate LAN and WAN protocol behavior using modern tools
C308.2	Examine the design issue, flow control and error control

C308.3	Demonstrate basic configuration of switches and routers.
C308.4	Analyze data flow between peer to peer in IP network using Application protocol and transport layer
Subject Code : 310249 Subject Name: Audit Course -III	
C309.1	Understand social ethics and being helpful to society.
C309.2	Evaluate the role of strategy and policy in determining the success of information security

TE Semester II

Subject Code : 310250 Subject Name: Design and Analysis of Algorithms	
C310.1	Describe fundamental concepts of Algorithms
C310.2	Formulate the problem using computational models for basic algorithms
C310.3	Discuss algorithmic strategies in order to find an optimal solution
C310.4	Analyze the asymptotic performance of algorithms belonging to P and NP classes
C310.5	Analyze Amortized performance of data structure and embedded algorithms
C310.6	Explain Multithreaded, Distributed and String Matching Algorithms
Subject Code : 310251 Subject Name: System Programming and Operating system	

C311.1	Analyze the design of an assembler
C311.2	Discuss data structures for the design of macro preprocessor, linker and loader
C311.3	Explain the basics of compiler
C311.4	Discuss operating system functions
C311.5	Describe memory management techniques
C311.6	Describe I/O and file management techniques
Subject Code : 310252 Subject Name: Embedded Systems & Internet of Things	
C312.1	Discuss Embedded System and Internet of Things
C312.2	Explain design methodologies for IoT platform
C312.3	Describe available technologies and devices for IoT
C312.4	Demonstrate IoT Protocols and Security
C312.5	Use the architecture for Web of Things and Cloud of Things
C312.6	Solve the given societal challenge using IoT
Subject Code : 310253 Subject Name: Software Modeling and Design	
C313.1	Analyze design techniques for designing web based/ desktop applications.
C313.2	Design applications using static modeling.

C313.3	Design applications using dynamic modeling.
C313.4	Discuss architectural design
C313.5	Apply design patterns for object oriented concept of reusability
C313.6	Describe testing techniques for web-based/desktop applications.
Subject Code : 310254 Subject: Web Technology	
C314.1	Discuss web development process and front end tools
C314.2	Apply JavaScript and jQuery to Validate the client side scripting
C314.3	Construct web based application using servlet and JSP for server side web technology
C314.4	Construct web based application using PHP for server side web technology
C314.5	Solve the complex problem using client and server side framework
C314.6	Identify web services and content management for solving problem
Subject Code : 310255 Seminar and Technical Communication	
C315.1	Identify basic technical writing concepts and terms, such as format, visuals, and presentation.
C315.2	Improve skills to read, understand, and interpret material on technology.
C315.3	Develop communication and writing skills
Subject Code : 310256 Subject: Web Technology Lab	

C316.1	Develop web based application using suitable client side and server side technology
C316.2	Develop solution to complex problem using appropriate method technology, framework, web services and content management
Subject Code : 310257 Subject Name: System Programming & Operating System Lab	
C317.1	Develop the basic operations of language translators using Java.
C317.2	Develop the basic operations of language translators using LEX & YACC.
C317.3	Write programs to perform the Operating System functionalities.
Subject Code : 310258 Subject Name: ESIOT LAB	
C318.1	Design minimum system for sensor based applications
C318.2	Solve the problems related to the primitive needs using IoT
C318.3	Develop fully fledged IoT applications for distributed environment
Subject Code : 310259 Subject Name: Audit Course -IV	
C319.1	Discuss leadership techniques in personality development
C319.2	Describe stress and time management skills

BE Semester I

Subject Code : 410241 Subject: High Performance Computing	
C401.1	Describe parallel computing hardware and programming models
C401.2	Explain performance of modern parallel computing systems
C401.3	Illustrate different parallel architectures, inter-connect networks, programming models
C401.4	Analyze models of parallel programs
C401.5	Solve a given problem using parallel algorithm
C401.6	Write parallel algorithm for a given problem using CUDA
Subject Code :410242 Subject Name: Artificial Intelligence & Robotics	
C402.1	Design smart system using informed search / uninformed search or heuristic approaches
C402.2	Solve problems using problem decomposition and planning
C402.3	Apply knowledge based reasoning to solve the problems
C402.4	Apply concept of natural language processing to cognitive computing problems.
C402.5	Explain fundamentals of mobile robotics
C402.6	Identify design issues of a robot for robotics applications

Subject Code : 410243		Subject: Data Analytics
C403.1	Describe life cycle phases of data Analytics	
C403.2	Apply Statistical Methods for Evaluation of problems	
C403.3	Apply Association Rules and Regression	
C403.4	Solve problems using classification algorithms.	
C403.5	Illustrate tools and techniques for big data visualization	
C403.6	Solve problem for multicore or distributed ,concurrent/parallel environments	
Subject Code : 410244D Subject: Data Mining & Warehousing		
C404.1	Discuss concepts of data and data preprocessing.	
C404.2	Describe the concept of data warehouse	
C404.3	Solve problems based on data similarity and dissimilarity	
C404.4	Apply associations rules based data mining for decision making.	
C404.5	Apply classification algorithms.	
C404.6	Explain classifier performance using metrics.	
Subject Code : 410244C		Subject: Pervasive and Ubiquitous Computing

C404.1	Design primitive pervasive applications.
C404.2	Explain open protocols, pervasive and web based applications
C404.3	Explain voice enabled pervasive computing and security.
C404.4	Discuss the concept of personal digital assistant.
C404.5	Solve user interface issues in Pervasive Computing.
C404.6	Develop skill sets to propose solutions for problems related to pervasive computing system.
Subject Code : 410245 A Subject: Distributed System	
C405A.1	Describe the concept of remote method invocation and Remote Procedure Calls
C405A.2	Discuss Distributed Algorithms
C405A.3	Explain Distributed Snapshot algorithms
C405A.4	Describe Distributed Consensus
C405A.5	Describe group communication methodology in distributed systems.
C405A.6	Demonstrate the security challenges faced by distributed systems
Subject Code : 410245B Subject: Software Testing and Quality Assurance	
C405B.1	Describe fundamental concepts of software quality assurance.
C405B.2	Explain test planning and its management.

C405B.3	Use concepts of software test automation
C405B.4	Apply Selenium automation tool for testing web based application
C405B.5	Discuss quality management, assurance, and quality standards
C405B.6	Explain Software Quality Tools and their effectiveness
Subject Code : 410246 Subject: Laboratory Practices-I	
C406.1	Develop parallel algorithms to solve problem
C406.2	Apply the suitable searching algorithms to solve AI problems
C406.3	Solve problems using classification algorithms.
Subject Code : 410247 Subject: Laboratory Practices-II	
C407.1	Develop pervasive or distributed applications
C407.2	Solve problems using data mining techniques.
C407.3	Apply recent automation tool for software testing.
Subject Code : 410248 Subject: Project Work -I	
C408.1	Knowledge Application & Independent Learning: Solve real life problems by applying knowledge and skills keeping eye on current technologies and inculcating the practice of lifelong learning

C410.6	Solve problems using unsupervised machine learning algorithms.
Subject Code : 410251 Subject Name: Information and Cyber Security	
C411.1	Describe the concepts of Network and Information Security
C411.2	Apply the classical cipher & symmetric key cryptography techniques
C411.3	Differentiate cryptography and authentication techniques
C411.4	Use IP security, Web security and Email security techniques to enhance the security against cyber-attacks.
C411.5	Differentiate types of firewall architectures and Intrusion detection systems
C411.6	Describe the role of digital forensics in the field of cyber-crime and information protection laws.
Subject Code : 410252 (C) Subject Name: Embedded and Real Time Operating System	
C412C.1	Illustrate embedded and real-time systems
C412C.2	Explain processors required for embedded and networked embedded systems
C412C.3	Use communication bus protocols for embedded and real-time systems
C412C.4	Classify scheduling algorithms in RTOS
C412C.5	Describe the Inter process communication for RTOS
C412C.6	Discuss multiprocessor scheduling and software development process in RTOS

C413C.1	Explain cloud computing concepts
C413C.2	Describe cloud storage, cloud based file system and security
C413C.3	Recognize virtualization concepts
C413C.4	Explain components of Amazon web services (AWS)
C413C.5	Demonstrate the applications based on Ubiquitous cloud computing
C413C.6	Discuss future trends of cloud computing
Subject Code : 410254 Subject: Laboratory Practices-III	
C414.1	Solve problems using supervised and unsupervised machine learning algorithms
C414.2	Demonstrate symmetric and asymmetric cryptography algorithms
Subject Code : 410255 Subject: Laboratory Practices-IV	
C415.1	Illustrate the concept of Embedded and real time OS/Soft Computing/Cloud Computing and HCI
C415.2	Construct system based on Embedded and real time OS/Soft Computing/Cloud Computing and HCI
Subject Code : 410257 Subject: Audit Course -VI	
C417.1	Describe the concepts of data warehousing in business intelligence
C417.2	Discuss the real world applications of business intelligence