SEMESTER : I/II	
18CPS13/23	**PROGRAMMING FOR PROBLEM SOLVING**
CO1:	Illustrate simple algorithms from the different domains such as mathematics, physics, etc.
CO2:	Construct a programming solution to the given problem using C.
CO2:	Identify and correct the syntax and logical errors in C programs.
CO2:	Modularize the given problem using functions and structures.

SEMESTER : I/II	
18CPL17/27	**C PROGRAMMING LABORATORY**
CO1:	Write algorithms, flowcharts and program for simple problems.
CO2:	Correct syntax and logical errors to execute a program.
CO2:	Write iterative and wherever possible recursive programs.
CO2:	Demonstrate use of functions, arrays, strings, structures and pointers in problem solving.

SEMESTER - III	
18MAT31	**TRANSFORM CALCULUS, FOURIER SERIES AND NUMERICAL TECHNIQUES**
CO1:	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
CO2:	Demonstrate Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory.
CO3:	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.
CO4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
CO5:	Determine the externals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

SEMESTER - III	
18CS32	**DATA STRUCTURES AND APPLICATIONS**
CO1:	Use different types of data structures, operations and algorithms
CO2:	Apply searching and sorting operations on files
CO3:	Use stack, Queue, Lists, Trees and Graphs in problem solving
CO4	Implement all data structures in a high-level language for problem solving.

SEMESTER - III	
18CS33	**ANALOG AND DIGITAL ELECTRONICS**
CO1:	Design and analyze application of analog circuits using photo devices, timer IC, power supply and regulator IC and op-amp.
CO2:	Explain the basic principles of A/D and D/A conversion circuits and develop the same.
CO3:	Simplify digital circuits using Karnaugh Map , and Quine-McClusky Methods.
CO4:	Explain Gates and flip flops and make us in designing different data processing circuits, registers and counters and compare the types
CO5:	Develop simple HDL programs

SEMESTER - III	
18CS34	**COMPUTER ORGANIZATION**
CO1:	Explain the basic organization of a computer system.
CO2:	Demonstrate functioning of different sub systems, such as processor, Input/output,and memory.
CO3:	Illustrate hardwired control and micro programmed control, pipelining, embedded and other computing systems.
CO4:	Design and analyse simple arithmetic and logical units.

SEMESTER - III	
18CS35	**SOFTWARE ENGINEERING**
CO1:	Design a software system, component, or process to meet desired needs within realistic constraints.
CO2:	Assess professional and ethical responsibility
CO3:	Function on multi-disciplinary teams
CO4	Use the techniques, skills, and modern engineering tools necessary for engineering practice
CO5:	Analyze, design, implement, verify, validate, implement, apply, and maintain software systems or parts of software systems

SEMESTER - III	
18CS36	**DISCRETE MATHEMATICAL STRUCTURES**
CO1:	Use propositional and predicate logic in knowledge representation and truth verification
CO2:	Demonstrate the application of discrete structures in different fields of computer science.
CO3:	Solve problems using recurrence relations and generating functions
CO4	Application of different mathematical proofs techniques in proving theorems in the courses.
CO5:	Compare graphs, trees and their applications.

SEMESTER - III	
18CSL37	**ANALOG AND DIGITAL ELECTRONICS LABORATORY**
CO1:	Use appropriate design equations / methods to design the given circuit.
CO2:	Examine and verify the design of both analog and digital circuits using simulators.
CO3:	Make us of electronic components, ICs, instruments and tools for design and testing of circuits for the given the appropriate inputs.
CO4	Compile a laboratory journal which includes; aim, tool/ instruments/ software/ components used, design equations used and designs, schematics, program listing, procedure followed, relevant theory, results as graphs and tables, interpreting and concluding the findings.

SEMESTER - III	
18CSL38	**DATA STRUCTURES LABORATORY**
CO1:	Analyze and Compare various linear and non-linear data structures
CO2:	Code, debug and demonstrate the working nature of different types of data structures and their applications
CO3:	Implement, analyze and evaluate the searching and sorting algorithms
CO4	Choose the appropriate data structure for solving real world problems.

SEMESTER - III	
18CPC39/49	**CONSTITUTION OF INDIA, PROFESSIONAL ETHICS AND CYBER LAW (CPC)**
CO1:	Have constitutional knowledge and legal literacy.
CO2:	Understand Engineering and Professional ethics and responsibilities of Engineers.
CO3:	Understand the the cybercrimes and cyber laws for cyber safety measures.

SEMESTER - III	
18MATDIP31	**ADDITIONAL MATHEMATICS – I**
CO1:	Apply concepts of complex numbers and vector algebra to analyze the problems arising in related area.
CO2:	Use derivatives and partial derivatives to calculate rate of change of multivariate functions.
CO3:	Analyze position, velocity and acceleration in two and three dimensions of vector valued functions
CO4	Learn techniques of integration including the evaluation of double and triple integrals.
CO5:	Identify and solve first order ordinary differential equations.

SEMESTER - IV	
18MAT41	**COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS**
CO1:	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.
CO2:	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
CO3:	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
CO4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
CO5:	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.

SEMESTER - IV	
18CS42	**DESIGN AND ANALYSIS OF ALGORITHMS**
CO1:	Describe computational solution to well known problems like searching, sorting etc.
CO2:	Estimate the computational complexity of different algorithms.
CO3:	Devise an algorithm using appropriate design strategies for problem solving.

SEMESTER - IV	
18CS43	**OPERATING SYSTEMS**
CO1:	Demonstrate need for OS and different types of OS
CO2:	Apply suitable techniques for management of different resources
CO3:	Use processor, memory, storage and file system commands
CO4	Realize the different concepts of OS in platform of usage through case studies

SEMESTER - IV	
18CS44	**MICROCONTROLLER AND EMBEDDED SYSTEMS**
CO1:	Describe the architectural features and instructions of ARM microcontroller
CO2:	Apply the knowledge gained for Programming ARM for different applications.
CO3:	Interface external devices and I/O with ARM microcontroller.

CO4	Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
CO5:	Develop the hardware /software co-design and firmware design approaches.
CO6:	Demonstrate the need of real time operating system for embedded system applications

SEMESTER - IV	
18CS45	**OBJECT ORIENTED CONCEPTS**
CO1:	Explain the object-oriented concepts and JAVA.
CO2:	Develop computer programs to solve real world problems in Java.
CO3:	Develop simple GUI interfaces for a computer program to interact with users, and to understand the event-based GUI handling principles using swings.

SEMESTER - IV	
18CS46	**DATA COMMUNICATION**
CO1:	Explain the various components of data communication.
CO2:	Explain the fundamentals of digital communication and switching.
CO3:	Compare and contrast data link layer protocols.
CO4	Summarize IEEE 802.xx standards

SEMESTER - IV	
8CSL47	**DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY**
CO1:	Design algorithms using appropriate design techniques (brute-force, greedy, dynamic programming, etc.)
CO2:	Implement a variety of algorithms such assorting, graph related, combinatorial, etc., in a high level language.
CO3:	Analyze and compare the performance of algorithms using language features.
CO4	Apply and implement learned algorithm design techniques and data structuresto solve real-world problems.

SEMESTER - IV	
18CSL48	**MICROCONTROLLER AND EMBEDDED SYSTEMS LABORATORY**
CO1:	Develop and test program using ARM7TDMI/LPC2148
CO2:	Conduct the following experiments on an ARM7TDMI/LPC2148 evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool/compiler.

SEMESTER - IV	
18MATDIP 41	**ADDITIONAL MATHEMATICS – II**
CO1:	Solve systems of linear equations using matrix algebra.
CO2:	Apply the knowledge of numerical methods in modelling and solving engineering problems.
CO3:	Make use of analytical methods to solve higher order differential equations.
CO4	Classify partial differential equations and solve them by exact methods..
CO5:	Apply elementary probability theory and solve related problems.

SEMESTER – V	
18CS51	**MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY**
CO1:	Define management, organization, entrepreneur, planning, staffing, ERP and outline their importance in entrepreneurship
CO2:	Utilize the resources available effectively through ERP
CO3:	Make use of IPRs and institutional support in entrepreneurship

SEMESTER - V	
18CS52	**ADDITIONAL MATHEMATICS – II**
CO1:	Explain principles of application layer protocols
CO2:	Recognize transport layer services and infer UDP and TCP protocols
CO3:	Classify routers, IP and Routing Algorithms in network layer
CO4	Understand the Wireless and Mobile Networks covering IEEE 802.11 Standard
CO5:	Describe Multimedia Networking and Network Management

SEMESTER - V	
18CS53	**DATABASE MANAGEMENT SYSTEM**
CO1:	Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS.
CO2:	Use Structured Query Language (SQL) for database manipulation.
CO3:	Design and build simple database systems
CO4	Develop application to interact with databases.

SEMESTER - V	
18CS54	**AUTOMATA THEORY AND COMPUTABILITY**
CO1:	Acquire fundamental understanding of the core concepts in automata theory and Theory of Computation
CO2:	Learn how to translate between different models of Computation (e.g., Deterministic and Non-deterministic and Software models).
CO3:	Design Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers.
CO4	Develop skills in formal reasoning and reduction of a problem to a formal model, with an emphasis on semantic precision and conciseness.
CO5:	Classify a problem with respect to different models of Computation.

SEMESTER - V	
18CS55	**APPLICATION DEVELOPMENT USING PYTHON**
CO1:	Demonstrate proficiency in handling of loops and creation of functions.
CO2:	Identify the methods to create and manipulate lists, tuples and dictionaries.
CO3:	Discover the commonly used operations involving regular expressions and file system.
CO4	Interpret the concepts of Object-Oriented Programming as used in Python.
CO5:	Determine the need for scraping websites and working with CSV, JSON and other file formats.

SEMESTER - V	
18CS56	**UNIX PROGRAMMING**
CO1:	Explain Unix Architecture, File system and use of Basic Commands
CO2:	Illustrate Shell Programming and to write Shell Scripts
CO3:	Categorize, compare and make use of Unix System Calls
CO4	Build an application/service over a Unix system.

SEMESTER - V	
18CSL57	**COMPUTER NETWORK LABORATORY**
CO1:	Analyze and Compare various networking protocols.
CO2:	Demonstrate the working of different concepts of networking.
CO3:	Implement, analyze and evaluate networking protocols in NS2 / NS3 and JAVA programming language

SEMESTER - V	
18CSL58	**DBMS LABORATORY WITH MINI PROJECT**
CO1:	Create, Update and query on the database.
CO2:	Demonstrate the working of different concepts of DBMS
CO3:	Implement, analyze and evaluate the project developed for an application.

SEMESTER - V	
18CIV59	**ENVIRONMENTAL STUDIES**
CO1:	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale,
CO2:	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
CO3:	Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components.
CO4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.

SEMESTER - VI	
18CS61	**SYSTEM SOFTWARE AND COMPILERS**
CO1:	Explain system software
CO2:	Design and develop lexical analyzers, parsers and code generators
CO3:	Utilize lex and yacc tools for implementing different concepts of system software

SEMESTER - VI	
18CS62	**COMUTER GRAPHICS AND VISUALIZATION**
CO1:	Design and implement algorithms for 2D graphics primitives and attributes.
CO2:	Illustrate Geometric transformations on both 2D and 3D objects.
CO3:	Apply concepts of clipping and visible surface detection in 2D and 3D viewing, and Illumination Models.
CO4:	Decide suitable hardware and software for developing graphics packages using OpenGL.

SEMESTER - VI	
18CS63	**WEB TECHNOLOGY AND ITS APPLICATIONS**
CO1:	Adapt HTML and CSS syntax and semantics to build web pages.
CO2:	Construct and visually format tables and forms using HTML and CSS
CO3:	Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically.
CO4:	Appraise the principles of object oriented development using PHP
CO5:	Inspect JavaScript frameworks like jQuery and Backbone which facilitates developer to focus on core features.

SEMESTER - VI	
18CS641	**DATA MINING AND DATA WAREHOUSING**
CO1:	Identify data mining problems and implement the data warehouse
CO2:	Write association rules for a given data pattern.
CO3:	Choose between classification and clustering solution.

SEMESTER - VI	
18CS642	**OBJECT ORIENTED MODELING AND DESIGN**
CO1:	Describe the concepts of object-oriented and basic class modelling.

CO2:	Draw class diagrams, sequence diagrams and interaction diagrams to solve problems.
CO3:	Choose and apply a befitting design pattern for the given problem.

SEMESTER - VI	
18CS643	**CLOUD COMPUTING AND ITS APPLICATIONS**
CO1:	Explain cloud computing, virtualization and classify services of cloud computing
CO2:	Illustrate architecture and programming in cloud
CO3:	Describe the platforms for development of cloud applications and List the application of cloud.

SEMESTER - VI	
18CS644	**ADVANCED JAVA AND J2EE**
CO1:	Interpret the need for advanced Java concepts like enumerations and collections in developing modular and efficient programs
CO2:	Build client-server applications and TCP/IP socket programs
CO3:	Illustrate database access and details for managing information using the JDBC API
CO4:	Describe how servlets fit into Java-based web application architecture
CO5:	Develop reusable software components using Java Beans

SEMESTER - VI	
18CS645	**SYSTEM MODELLING AND SIMULATION**
CO1:	Explain the system concept and apply functional modeling method to model the activities of a static system
CO2:	Describe the behavior of a dynamic system and create an analogous model for a dynamic system;
CO3:	Simulate the operation of a dynamic system and make improvement according to the simulation results.

SEMESTER - VI	
18CS651	**MOBILE APPLICATION DEVELOPMENT**
CO1:	Create, test and debug Android application by setting up Android development environment
CO2:	Implement adaptive, responsive user interfaces that work across a wide range of devices.
CO3:	Infer long running tasks and background work in Android applications

CO4:	Demonstrate methods in storing, sharing and retrieving data in Android applications
CO5:	Analyze performance of android applications and understand the role of permissions and security
CO6:	Describe the steps involved in publishing Android application to share with the world

SEMESTER - VI	
18CS652	**INTRODUCTION TO DATA SRUCTURES AND ALGORITHM**
CO1:	Identify different data structures in C programming language
CO2:	Appraise the use of data structures in problem solving
CO3:	Implement data structures using C programming language.

SEMESTER - VI	
18CS653	**PROGRAMMING IN JAVA**
CO1:	Explain the object-oriented concepts and JAVA.
CO2:	Develop computer programs to solve real world problems in Java. Develop simple GUI interfaces for a computer program to interact with users

SEMESTER - VI	
18CS654	**INTRODUCTION TO OPERATING SYSTEM**
CO1:	Explain the fundamentals of operating system
CO2:	Comprehend process management, memory management and storage management.
CO3:	Familiar with various types of operating systems

SEMESTER - VI	
18CSL66	**SYSTEM SOFTWARE LABORATORY**
CO1:	Implement and demonstrate Lexer‟s and Parser‟s
CO2:	Evaluate different algorithms required for management, scheduling, allocation and communication used in operating system

SEMESTER - VI	
18CSL67	**COMPUTER GRAPHICS LABORATORY WITH MINI PROJECT**
CO1:	Apply the concepts of computer graphics

CO2:	Implement computer graphics applications using OpenGL
CO3:	Animate real world problems using OpenGL
SEMESTER - VI	
18CSMP68	**MOBILE APPLICATION DEVELOPMENT**
CO1:	Create, test and debug Android application by setting up Android development environment.
CO2:	Implement adaptive, responsive user interfaces that work across a wide range of devices.
CO3:	Infer long running tasks and background work in Android applications.
CO4:	Demonstrate methods in storing, sharing and retrieving data in Android applications.

SEMESTER - VII	
18CS71	**ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING**
CO1:	Appraise the theory of Artificial intelligence and Machine Learning.
CO2:	Illustrate the working of AI and ML Algorithms.
CO3:	Demonstrate the applications of AI and ML.

SEMESTER - VII	
18CS72	**BIG DATA AND ANALYTICS**
CO1:	Understand fundamentals of Big Data analytics.
CO2:	Investigate Hadoop framework and Hadoop Distributed File system.
CO3:	Illustrate the concepts of NoSQL using MongoDB and Cassandra for Big Data.
CO4:	Demonstrate the MapReduce programming model to process the big data along with Hadoop tools.
CO5:	Use Machine Learning algorithms for real world big data.
CO6:	Analyze web contents and Social Networks to provide analytics with relevant visualization tools.

SEMESTER - VII	
18CS731	**SOFTWARE ARCHITECTURE AND DESIGN PATTERNS**
CO1:	Design and implement codes with higher performance and lower complexity
CO2:	Be aware of code qualities needed to keep code flexible
CO3:	Experience core design principles and be able to assess the quality of a design with respect to these principles.
CO4:	Capable of applying these principles in the design of object oriented systems.
CO5:	Demonstrate an understanding of a range of design patterns. Be capable of comprehending a design presented using this vocabulary.
CO6:	Be able to select and apply suitable patterns in specific contexts

SEMESTER - VII	
18CS732	**HIGH PERFORMANCE COMPUTING**
CO1:	Illustrate the key factors affecting performance of CSE applications

CO2:	Illusrate mapping of applications to high-performance computing systems
CO3:	Apply hardware/software co-design for achieving performance on real-world applications

SEMESTER - VII	
18CS733	**ADVANCED COMPUTER ARCHITECTURES**
CO1:	Explain the concepts of parallel computing and hardware technologies
CO2:	Compare and contrast the parallel architectures
CO3:	Illustrate parallel programming concepts

SEMESTER - VII	
18CS734	**USER INTERFACE DESIGN**
CO1:	Design the User Interface, design, menu creation, windows creation and connection between menus and windows

SEMESTER - VII	
18CS741	**DIGITAL IMAGE PROCESSING**
CO1:	Explain fundamentals of image processing
CO2:	Compare transformation algorithms
CO3:	Contrast enhancement, segmentation and compression techniques

SEMESTER - VII	
18CS742	**NETWORK MANAGEMENT**
CO1:	The question paper will have ten questions.
CO2:	Each full Question consisting of 20 marks
CO3:	There will be 2 full questions (with a maximum of four sub questions) from each module.
CO4:	Each full question will have sub questions covering all the topics under a module.
CO5:	The students will have to answer 5 full questions, selecting one full question from each module.

SEMESTER - VII	
18CS743	**NATURAL LANGUAGE PROCESSING**
CO1:	Analyze the natural language text.
CO2:	Define the importance of natural language.
CO3:	Understand the concepts Text mining.
CO4:	Illustrate information retrieval techniques.

SEMESTER - VII	
18CS744	**CRYPTOGRAPHY**
CO1:	Define cryptography and its principles
CO2:	Explain Cryptography algorithms
CO3:	Illustrate Public and Private key cryptography
CO4:	Explain Key management, distribution and ceritification
CO5:	Explain authentication protocols
CO6:	Tell about IPSec

SEMESTER - VII	
18CS745	**ROBOTIC PROCESS AUTOMATION DESIGN & DEVELOPMENT**
CO1:	To understand Basic Programming concepts and the underlying logic/structure
CO2:	To Describe RPA , where it can be applied and how its implemented
CO3:	To Describe the different types of variables, Control Flow and data manipulation techniques
CO4:	To Understand Image, Text and Data Tables Automation
CO5:	To Describe automation to Email and various types of Exceptions and strategies to handle

SEMESTER - VII	
18CS751	**INTRODUCTION TO BIG DATA ANALYTICS**
CO1:	Explain the importance of data and data analysis
CO2:	Interpret the probabilistic models for data

CO3:	Define hypothesis, uncertainty principle
CO4:	Evaluate regression analysis

SEMESTER - VII	
18CS752	**PYTHON APPLICATION PROGRAMMING**
CO1:	Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
CO2:	Demonstrate proficiency in handling Strings and File Systems.
CO3:	Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
CO4:	Interpret the concepts of Object-Oriented Programming as used in Python.
CO5:	Implement exemplary applications related to Network Programming, Web Services and Databases in Python.

SEMESTER - VII	
18CS753	**INTRODUCTION TO ARTIFICIAL INTELLIGENCE**
CO1:	Identify the AI based problems
CO2:	Apply techniques to solve the AI problems
CO3:	Define learning and explain various learning techniques
CO4:	Discuss on expert systems

SEMESTER - VII	
18CS754	**INTRODUCTION TO DOT NET FRAMEWORK FOR APPLICATION DEVELOPMENT**
CO1:	Build applications on Visual Studio .NET platform by understanding the syntax and semantics of C#
CO2:	Demonstrate Object Oriented Programming concepts in C# programming language
CO3:	Design custom interfaces for applications and leverage the available built-in interfaces in building complex applications.
CO4:	Illustrate the use of generics and collections in C#
CO5:	Compose queries to query in-memory data and define own operator behaviour

SEMESTER - VII	
18CSL76	**ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING LABORATORY**
CO1:	Implement and demonstrate AI and ML algorithms.
CO2:	Evaluate different algorithms.

SEMESTER - VIII	
18CS81	**INTERNET OF THINGS**
CO1:	Interpret the impact and challenges posed by IoT networks leading to new architectural models.
CO2:	Compare and contrast the deployment of smart objects and the technologies to connect them to network.
CO3:	Appraise the role of IoT protocols for efficient network communication.
CO4:	Elaborate the need for Data Analytics and Security in IoT.
CO5:	Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

SEMESTER - VIII	
18CS821	**MOBILE COMPUTING**
CO1:	Explain state of art techniques in wireless communication.
CO2:	Discover CDMA, GSM. Mobile IP, WImax
CO3:	Demonstrate program for CLDC, MIDP let model and security concerns

SEMESTER - VIII	
18CS822	**STORAGE AREA NETWORKS**
CO1:	Identify key challenges in managing information and analyze different storage networking technologies and virtualization
CO2:	Explain components and the implementation of NAS
CO3:	Describe CAS architecture and types of archives and forms of virtualization
CO4:	Illustrate the storage infrastructure and management activities

SEMESTER - VIII	
18CS823	**NOSQL DATABASE**
CO1:	Define, compare and use the four types of NoSQL Databases (Document-oriented, KeyValue Pairs, Column-oriented and Graph).

CO2:	Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases.
CO3:	Explain the detailed architecture, define objects, load data, query data and performance tune Document-oriented NoSQL databases.

SEMESTER - VIII	
18CS824	**MULTICORE ARCHITECTURE AND PROGRAMMING**
CO1:	Identify the limitations of ILP and the need for multicore architectures
CO2:	Define fundamental concepts of parallel programming and its design issues
CO3:	Solve the issues related to multiprocessing and suggest solutions
CO4:	Make out the salient features of different multicore architectures and how they exploit parallelism
CO5:	Demonstrate the role of OpenMP and programming concept