

J.B.S.P. Sanstha's
Changu Kana Thakur Arts, Commerce & Science College, New Panvel
Department of Information Technology

Level : U.G.

Programme Specific Outcome

- PSO1 Learners are able to work effectively in IT industries in field of project management.
- PSO2 Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks. Able to understand building blocks of Internet of Things and characteristics.
- PSO3 Learners are able to configure different types of servers on Linux Platform.
- PSO4 Learners are able to create application projects using different technologies such as enterprise java and .Net.
- PSO5 Learners are able to build and enhance business intelligence capabilities by adapting the appropriate technology and software solutions.

Course Outcomes

Class: F.Y.B. Sc. Information Technology

Semester I

Course (Paper) Name and No.: Introduction to C++ Programming (P-I)

- CO1 Learners will be able to understand the Basic concepts of C++ programming.
- CO2 Learners will be able to understand concept of Loops and manipulators.
- CO3 Learners will be able to learn the use of functions in C++ program.
- CO4 Learners will be able to understand various Data types.
- CO5 Learners will be able to gain expertise over concepts of string, vectors and structures.

Course (Paper) Name and No.: Digital Electronics (P-II)

- CO1 Learners will be able to understand number representation and conversion between different representations in digital electronic circuits.
- CO2 Learners will be able to analyze logic processes and implement logical operations using combinational logic circuits.
- CO3 Learners will be able to understand concepts of sequential circuits and to analyse sequential systems in terms of state machines.
- CO4 Learners will be able to design and analyze of electronic circuits using multiplexers, de-multiplexers, encoders, decoders and flip- flops.
- CO5 Learners will be able to understand the functioning of counters and shift registers with respect to its application in electronic display and sequence generator.

Course (Paper) Name and No.: Operating Systems (P-III)

- CO1 Learners will be able to describe the importance of computer system, Process management policies and scheduling of processes by CPU.
- CO2 Learners will be able to describe and analyses the memory management and its allocation policies.
- CO3 Learners will be able to understand the File systems, its structure and operations.
- CO4 Learners will be able to evaluate the requirement for process synchronization and coordination handled by operating system.
- CO5 Learners will be able to identify the need to create the special purpose operating system.

Course (Paper) Name and No.: Discrete Mathematics (P-IV)

- CO1 Learners will be able to learn the discrete theory, logic form, its equivalence, quantified statements.
- CO2 Learners will be able to solve the recurrence relations, generating function and operation on them.
- CO3 Learners will be able to solve the probability problems, combination and permutations as well as the mathematical induction.
- CO4 Learners will be able to learn the properties of graphs, tree, isomorphism of trees and finding the shortest path.
- CO5 Learners will be able to learn the direct proofs, divisibility, quotient-remainder theorem, contraposition and contradiction.

Course (Paper) Name and No.: Communication Skills (P-V)

- CO1 Learners will be able to understand the basics of Business communication.
- CO2 Learners will be able to learn to write business messages appropriately.
- CO3 Learners will be able to learn how to talk in meetings or group discussion i.e. orally.
- CO4 Learners will be able to learn how to communicate in different fields or departments.
- CO5 Learners will be able to learn to make presentations and how to present one.

Semester II

Course (Paper) Name and No.: Object oriented Programming (P-I)

- CO1 Learners will be able to learn advanced features of C++ programming language as a continuation of the previous course, to learn the characteristics of an object oriented programming language.
- CO2 Learners will be able to use classes, constructors and destructors.
- CO3 Learners will be able to learn to use Polymorphism virtual, function.
- CO4 Learners will be able to learn to use program development using inheritance, exception handling.
- CO5 Learners will be able to working with template and files.

Course (Paper) Name and No.: Microprocessor Architecture (P-II)

- CO1 Learners will be able to understand basics about Microprocessor.
- CO2 Learners will be able to learn concepts of microprocessor architecture, interface devices and Assembly Language.
- CO3 Learners will be able to learn additional programming techniques.
- CO4 Learners will be able to understand concepts of Stacks and subroutines and BCD arithmetic.
- CO5 Learners will be able to learn about Software development system.

Course (Paper) Name and No.: Database Management System (P-III)

- CO1 Learners will be able to design the database schema with the use of appropriate data types for Storage of data in database.
- CO2 Learners will be able to design relational databases.
- CO3 Learners will be able to create, manipulate, query and back up the databases.
- CO4 Learners will be able to Manage the transaction of databases.
- CO5 Learners will be able to perform the Basic SQL Programming.

Course (Paper) Name and No.: Numerical Methods (P-IV)

- CO1 Learners will be able to solve the equations using bisection, newton raphson method and iterative methods.
- CO2 Learners will be able to learn newton's forward difference and newton' backward difference interpolation, lagrange and spline interpolation.
- CO3 Learners will be able to solve derivatives using the newton forward and backward difference interpolation.
- CO4 Learners will be able to solve the integrations using various numerical methods and solving the double integrals.
- CO5 Learners will be able to find the characteristics value using the power method and solutions to the equations using direct methods

Course (Paper) Name and No.: Web Programming (P-V)

- CO1 Learners will be able to develop simple web pages and apply formatting to it.
- CO2 Learners will be able to design forms and incorporate audio and video on web pages.
- CO3 Learners will be able to handle user events through client side scripting.
- CO4 Learners will be able to develop dynamic web pages using server side scripting.
- CO5 Learners will be able to provide interaction between web pages and databases using server side scripting.

Class: S.Y.B. Sc. Information Technology

Semester III

Course (Paper) Name and No.: Python Programming (P-I)

- CO1 Learners will be able to understand basic features like Variables, Operators, Math functions, various Decision Making statements.
- CO2 Learners will be able to understand different Functions & Strings
- CO1 Learners will be able to understand and summarize Lists, Tuples, Dictionaries, Different File Handling& Error Handling operations.
- CO2 Learners will be able to understand Interpret Object Oriented Programming in Python.
- CO Learners will be able to design GUI Application in Python & evaluate Database operations.

Course (Paper) Name and No.: Data Structures (P-II)

- CO1 Learners will be able to understand the basics of algorithm analysis.
- CO2 Learners will be able to describe operations on linked list.
- CO3 Learners will be able to understand analysis of stack and queue operations.
- CO4 Learners will be able to understand different searching and sorting techniques tree and AVL tree structures.
- CO5 Learners will be able to analyze graphs and hashing techniques

Course (Paper) Name and No.: Computer Networks (P-III)

- CO1 Learners will get Knowledge about computer networking basics
- CO2 Learners will be able to understand different data transmission mediums.
- CO3 Learners will be able to understand different types of wired and wireless networking technologies.
- CO4 Learners will be able to understand Functionality of the Network layer.
- CO5 Learners will be able to understand various Transport layer protocols.

Course (Paper) Name and No.: Advanced SQL (P-IV)

- CO1 Learners will be able to design the database with SQL.
- CO2 Learners will be able to work with various databases objects.
- CO3 Learners will be able to perform basic PL/SQL Programming.
- CO4 Learners will be able to develop efficient PL/SQL programs to access Oracle databases using Control structures, Exception handling, composite data type, Cursors.
- CO5 Learners will be able to perform the advanced PL/SQL Programming.

Course (Paper) Name and No.: Applied Mathematics (P-V)

- CO1 Learners will be able to gain expertise in solving matrices using different methods and polar, exponential form of complex as well as hyperbolic functions.
- CO2 Learners will be able to solve the differential equation using various methods and differential equations with constant coefficients.
- CO3 Understand the properties and theorems of laplace and integrate the laplace transform and find the inverse laplace using differential equations.
- CO4 Learners will be able to find double and triple integrals in polar coordinates and area, volume using double and triple integrals.
- CO5 Learners will be able to understand the properties of beta, gamma functions and solve the error functions.

Semester IV

Course (Paper) Name and No.: Core Java (P-I)

- CO1 Learner will be introduced with the basic concepts and terminologies of java programming
- CO2 Learner will be able to develop java code using control structures, iteration
- CO3 Learner will use the advance class features including inheritance, polymorphism and overloading, overriding, interfaces, abstract classes and develop efficient and reusable codes
- CO4 Learners will be made familiar with multithreading, IO File handling and exception handling techniques.

CO5 Learner will be able to design, develop and execute AWT application

Course (Paper) Name and No.: Introduction to Embedded System (P-II)

CO1 Learners will become familiar with classification, characteristics, core components of embedded system

CO2 Learners will become familiar with memory, types of memory, registers

CO3 Learners will acquire skills in 8051 programming in C

CO4 Learners will acquire skills for selecting microcontroller and developing basic applications.

CO5 Learners will be familiar with different types of operating system and its characteristics.

Course (Paper) Name and No.: Computer Oriented Statistical Techniques (P III)

CO1 Learner will be able to calculate and apply measures of dispersion.

CO2 Learner will be able to apply discrete and continuous probability distribution to various problems.

CO3 Learner will be able to test the hypothesis as well as calculate confidence interval and the p-concept.

CO4 Learner will be able to learn non-parametric test such as the Chi-square test for independence as well as goodness of fit.

CO5 Learner will be able to compute and interpret the results of bivariate and multivariate regression and correlation analysis and to perform ANOVA.

Course (Paper) Name and No.: Software Engineering (P-IV)

- CO1 Learners will be able to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment
- CO2 Learners will have an ability to work in one or more significant application domains
- CO3 Learners will be able to work as an individual and as part of a multidisciplinary team to develop and deliver quality software
- CO4 Learners will be able to understand and apply current theories, models, and techniques that provide a basis for the software lifecycle
- CO5 Learners will be able to use the techniques and tools necessary for engineering practice

Course (Paper) Name and No.: Computer Graphics and Animation (PV)

- CO1 Learners will be able to understand computer graphics.
- CO2 Learners will be able to do 2D & 3D transformations.
- CO3 Learners will be able to create 3D objects using lines and color.
- CO4 Learners will be able to create different objects with different planes, curves.
- CO5 Learners will be able to do animation through programming.

Class: T.Y.B. Sc. Information Technology

Semester V

Course (Paper) Name and No.: Software Project Management (P-I)

- CO1 Learners will be able to clear the idea about project planning.
- CO2 Learners will be able to determine Success criteria for a project.
- CO3 Learners will be able to reduce some risk certain of appropriate prototype
- CO4 Learners will be able to determine, estimate the overall duration of project.
- CO5 Learners will be able to Identify the resource requirements.

Course (Paper) Name and No.: Internet of Things (P-II)

- CO1 Learners will be able to Interpret the vision of IoT from a global context
- CO2 Learners will be able to become familiar with IoT hardware components
- CO3 Learners will be able to acquire skills to design 3D modules
- CO4 Learners will be able to determine the Market perspective of IoT
- CO5 Learners will be able to acquire skills on developing their enterprise level technical strategies

Course (Paper) Name and No.: Advanced Web Programming (P-III)

- CO1 Learners will be able to do programming with C# Language.
- CO2 Learners will be able to acquire skills to design web page incorporate with different server controls on web pages.
- CO3 Learners will be able to acquire skills to handle Error Handling, Logging, and Tracing , State Management
- CO4 Learners will be able to acquire skills to develop dynamic web pages using ADO.NET Fundamentals
- CO5 Learners will be able to provide interaction between web pages using ASP.NET AJAX.

Course (Paper) Name and No.: Linux System Administration (P-IV)

- CO1 Learners will be able to acquire skills to manage system level processes and handle software management on linux platforms.
- CO2 Learners will be able to handle user accounts and manage storage space on systems.
- CO3 Learners will be able to configure firewall and provide security to data on linux machines through cryptography
- CO4 Learners will be able to acquire skills to configure different types of servers.
- CO5 Learners will be able to do shell level programming in Linux

Course (Paper) Name and No.: Enterprise Java (P-V)

- CO1 Learners will be able to create servlet and develop java applications with database connectivity.
- CO2 Learners will study the fundamentals and core concepts of cookies, session, file uploading, file downloading and request dispatcher
- CO3 Learners will gain knowledge and experience required to develop and deploy JSP application using JSTL.
- CO4 Learners will be able to develop and deploy EJB application with concepts of Interceptors, JNDI.
- CO5 Learners will be familiar with the development of application using concept of Persistence, Object/Relational Mapping, JPA and Hibernate.

Semester VI

Course (Paper) Name and No.: Software Quality Assurance (P-I)

- CO1 Learners will be able to analyse the quality of software product
- CO2 Learners will be able to understand different testing methodology
- CO3 Learners will be able to analyse the difference between black box and white box testing
- CO4 Learners will be able to understand verification and validation techniques
- CO5 Learners will be able to understand special types of testing and levels of testing

Course (Paper) Name and No.: Security in Computing (P-II)

- CO1 Learners will be able to introduce to basics of information security with risk analysis and design
- CO2 Learners will be able to identify some of the factors driving the need for Database and storage security
- CO3 Learners will be able to identify some of the factors driving the need for Network security
- CO4 Learners will be able to gather information about multiple attacks, vulnerabilities and how to detect & prevent them.
- CO5 Learners will be aware of information about cloud storage, virtualization and how to secure them

Course (Paper) Name and No.: Business Intelligence (P-III)

- CO1 Learners will be able to Identify the major frameworks of computerized decision support: decision support systems (DSS), data analytics and business intelligence.
- CO2 Learners will be able to analyze data, choose relevant models and algorithms for respective applications
- CO3 Learners will be able to become familiar with classification methods, clustering methods.
- CO4 Learners will be able to design application using Business Intelligence techniques.
- CO5 Learners will be able to ability to design and develop the AI applications in real world

scenario

Course (Paper) Name and No.: Principles of Geographic Information Systems (P-IV)

- CO1 Learners will be able to get introduction about basic GIS data types and technologies
- CO2 Learners will be able to get knowledge about various GIS data management and processing techniques.
- CO3 Learners will be able to Learn Spatial data processing techniques and positioning.
- CO4 Learners will be able to learn various functions in GIS.
- CO5 Learners will be able to create various maps in GIS

Course (Paper) Name and No.: IT Service Management (P-V)

- CO1 Learners will be able to gain understanding of scope, purpose, and objective of Service Management.
- CO2 Learners will be able to understand Service Design, Service Design Principles and its Strategies.
- CO3 Learners will be able to understand implementation of services through Service Transition Phase.
- CO4 Learners will be able to understand Service Operation Phase and activities for operating services.
- CO5 Learners will be able to understand Process of Continual Service Improvement and its challenges delivering the service.

Level : P.G.

Programme Specific Outcome

- PSO1 Learners are able to enter new problem areas that require an analytic and innovative approach.
- PSO2 Learners are able to gather, assess, and make use of new information.
- PSO3 Learners are able to combine and use knowledge from several topics.
- PSO4 Learners are able to apply advanced theoretical and practical methods gained from various subjects.
- PSO5 Learners are able to develop and renew Information Technology competence.

Course Outcomes

Class: M.Sc. I Information Technology

Semester I

Course (Paper) Name and No.: P-I, Research in Computing

- CO1 A learner will be able to: solve real world problems with scientific approach.
- CO2 develop analytical skills by applying scientific methods.
- CO3 Recognize, understand and apply the language, theory and models of the field of business analytics .
- CO4 Foster an ability to critically analyze, synthesize and solve complex unstructured business problems .
- CO5 Understand and critically apply the concepts and methods of business analytics .

Course (Paper) Name and No.: P-II, Data Science

- CO1 Recognize and analyze ethical issues in business related to intellectual property, data security, integrity, and privacy.
- CO2 Apply ethical practices in everyday business activities and make wellreasoned ethical business and data management decisions.
- CO3 Demonstrate knowledge of statistical data analysis techniques utilized in business decision making.
- CO4 Apply principles of Data Science to the analysis of business problems.
- CO5 Demonstrate use of team work, leadership skills, decision making and organization theory.

Course (Paper) Name and No.: P III, Cloud Computing

- CO1 Analyze the Cloud computing setup with its vulnerabilities and applications using different architectures.
- CO2 Design different workflows according to requirements and apply map reduce programming model.
- CO3 Apply and design suitable Virtualization concept, Cloud Resource Management and

design scheduling algorithms.

- CO4 Create combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds
- CO5 Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application

Course (Paper) Name and No.: P-IV, Soft Computing Techniques

- CO1 Identify and describe soft computing techniques and their roles in building intelligent machines.
- CO2 Recognize the feasibility of applying a soft computing methodology for a particular problem.
- CO3 Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
- CO4 Apply genetic algorithms to combinatorial optimization problems.
- CO5 Evaluate and compare solutions by various soft computing approaches for a given problem.

Semester II

Course (Paper) Name and No.: P-I, Big Data Analytics

- CO1 Students will able to Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents.
- CO2 Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.
- CO3 Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing.
- CO4 Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.
- CO5 Formulate and solve problems with uncertain information using Bayesian approaches.

Course (Paper) Name and No.: P-II Modern Networking

- CO1 Demonstrate in-depth knowledge in the area of Computer Networking.
- CO2 To demonstrate scholarship of knowledge through performing in a group to identify, formulate and solve a problem related to Computer Networks.
- CO3 Prepare a technical document for the identified Networking System Conducting experiments to analyze the identified research work in building Computer Networks.

Course (Paper) Name and No.: P-III Microservices Architecture

- CO1 Develop web applications using Model View Control. Create MVC Models and write code that implements business logic within Model methods, properties, and events.
- CO2 Create Views in an MVC application that display and edit data and interact with Models and Controllers.
- CO3 Gaining a thorough understanding of the philosophy and architecture of .NET
- CO4 Core Understanding packages, met packages and frameworks .
- CO5 Acquiring a working knowledge of the .NET programming model .

Course (Paper) Name and No.: P-IV Image Processing

- CO1 Understand the relevant aspects of digital image representation and their practical implications.
- CO2 Have the ability to design pointwise intensity transformations to meet stated specifications.
- CO3 Understand 2-D convolution, the 2-D DFT, and have the ability to design systems using these concepts.

CO4 Have a command of basic image restoration techniques.

CO5 Understand the role of alternative color spaces, and the design requirements leading to choices of color space.

Class: M.Sc. II Information Technology

Semester III

Course (Paper) Name and No.: P-I, Embedded system

- CO1 Learners will be able design, describe, validate and optimize embedded electronic systems in different industrial application areas.
- CO2 Learners will be able define hardware and software communication and control requirements.
- CO3 Learners will be able to acquire knowledge of and be able to use tools for the development and debugging of programs implemented on microcontrollers and DSPs.
- CO4 Learners will be able to design electronic circuits for the processing of information in communications and control systems.
- CO5 Learners will be able to acquire knowledge of sensor properties and apply these in the design of Electronic systems which integrate measurement and actuation in different industrial production contexts.

Course (Paper) Name and No.: P-II, Information Security Management

- CO1 Learners will be able to identify potential problems before they occur so that risk-handling activities may be planned and invoked as needed across life of product or project to mitigate adverse impacts on achieving objectives with Risk management
- CO2 Learners will be able provide a basic level of security, independent of external requirements so they can maintain the uninterrupted operation of the IT organization.
- CO3 Learners will be able to be aware of key management which is the process of administering or managing cryptographic keys for a cryptosystem.
- CO4 Learners will be aware of the risks or threats to the success of the plan and test the controls in place to determine whether or not those risks are acceptable.
- CO5 Learners will be able to know the basic process of identifying, preserving, analyzing and presenting the digital evidence in such a manner that the evidences are legally acceptable.

Course (Paper) Name and No.: P-III, Virtualization

- CO1 Learners will be aware of Introduction to virtualization types.
- CO2 Learners will understand Virtual machines and Implementation of virtual machines
- CO3 Learners will understand virtualization and various ways of using virtualization.
- CO4 Learners would be able to understand Implementation of private cloud platform using virtualization.
- CO5 Learners would be able to understand Blade servers.

Course (Paper) Name and No.: P-IV, Ethical Hacking

- CO1 Learners will able to learn about basics of ethical hacking and its phases.
- CO2 Learners will able to know how to hack systems & protect systems from Trojans, Backdoors, Virus & worms
- CO3 Learners will able to understand about methods of hacking.
- CO4 Learners will able to know how to hack web applications, wireless networks mobile platforms ethically and techniques like SQL injection
- CO5 Learners will able to understand about firewalls, Encryption & Decryption methods.

Semester IV

Course (Paper) Name and No.: P-I, Artificial Intelligence

- CO1 Learners will able to demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents.
- CO2 Learners will able to demonstrate the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.
- CO3 Learners will able to formulate and solve problems with uncertain information using Bayesian approaches.
- CO4 Learners will able to attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.
Students will able to understand basics in Prolog Programming.

Course (Paper) Name and No.: P-II, IT Infrastructure Management

- CO1 Learners will able to will gain knowledge on development of service concepts in preparation for the selection of services to be provided.
- CO2 Learners will able to will be able to design profitable services that provides high level of quality to satisfy the business needs.
- CO3 Learners will able to will be able to identify any potential risk and provide measures to overcome its impact on other services and business.
- CO4 Learners will able to will become familiar with IT service operations used to ensure that the required IT services are delivered efficiently and effectively as per the service level agreements to the business users and customers.
- CO5 Learners will able to will learn about continuously improving the service quality after the service the service has been put into operation.

Course (Paper) Name and No.: P-III, Computer Forensics

- CO1 Learn Basics about Computer Forensics
- CO2 Learn about processing crimes and how to use latest technology
- CO3 Lear about Macintosh OS and other forensic analysis techniques.
- CO4 Learn about Virtual Machines and network forensics
- CO5 Learn how to write report and give expert testimony

Course (Paper) Name and No.: P-IV, Cloud Management

- CO1 Learners would be able to understand virtualized data centers.
- CO2 Learners would be able to understand storage network designs.
- CO3 Learners would be able to understand system centre 2012.
- CO4 Learners would be able to understand different components of system centre 2012.
- CO5 Learners should be able to understand different cloud management platforms.