



## Dept. of Information Science & Engineering

### The COs of 21 Scheme subject wise

#### III Semester

**Course Code:** BSC  
**Subject Code** 21MAT31

**Subject Name** Transform Calculus, Fourier Series and Numerical Techniques

#### Course Outcomes:

- CO1 To have an insight into solving ordinary differential equations by using Laplace transform techniques
- CO2 Learn to use the Fourier series to represent periodical physical phenomena in engineering analysis.
- CO3 To enable the students to study Fourier Transforms and concepts of infinite Fourier Sine and Cosine transforms and to learn the method of solving difference equations by the z-transform method.
- CO4 To develop the proficiency in solving ordinary and partial differential equations arising in engineering applications, using numerical methods

**Course Code:** IPCC  
**Subject Code** 21CS32

**Subject Name** Data Structures and Applications

#### Course Outcomes

- CO1 Explain the fundamentals of data structures and their applications essential for implementing solutions to problems.
- CO2 Illustrate representation of data structures: Stack, Queues, Linked Lists, Trees and Graphs.
- CO3 Design and Develop Solutions to problems using Arrays, Structures, Stack, Queues, Linked Lists.
- CO4 Explore usage of Trees and Graph for application development.
- CO5 Apply the Hashing techniques in mapping key value pairs.



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#29, Chimney Hills, Hesaraghatta Main Road, Chikkabanavara Post, Bengaluru- 560090

**Course Code:** IPCC  
**Subject Code** 21CS33

**Subject Name** Analog and Digital Electronics

## Course Outcomes

- CO1 Explain the use of photo electronics devices, 555 timer IC, Regulator ICs and uA741
- CO2 Make use of simplifying techniques in the design of combinational circuits.
- CO3 Illustrate combinational and sequential digital circuits
- CO4 Demonstrate the use of flip-flops and apply for registers
- CO5 Design and test counters, Analog-to-Digital and Digital-to-Analog conversion techniques.

**Course Code:** PCC

**Subject Code** 21CS34

**Subject Name** Computer Organization and Architecture

## Course Outcomes

- CO1 Understand the organization and architecture of computer systems, their structure and operation
- CO2 Illustrate the concept of machine instructions and programs
- CO3 Demonstrate different ways of communicating with I/O devices
- CO4 Describe different types memory devices and their functions
- CO5 Explain arithmetic and logical operations with different data types



**Course Code:** PCC

**Subject Code** 21CSL35

**Subject Name** Object Oriented Programming with JAVA Laboratory

Course Outcomes

- CO1 Demonstrate the use of Eclipse/Netbeans IDE to create Java Applications.
- CO2 Using java programming to develop programs for solving real-world problems.
- CO3 Reinforce the understanding of basic object-oriented programming concepts.

**Course Code:** AEC

**Subject Code** 21CSL381

**Subject Name** Mastering Office

Course Outcomes

- CO1 Understand the basics of computers and prepare documents and small presentations.
- CO2 Attain the knowledge about spreadsheet/worksheet with various options.
- CO3 Create simple presentations using templates various options available.
- CO4 Demonstrate the ability to apply application software in an office environment.
- CO5 Use MS Office to create projects, applications.



## IV Semester

**Course Code:** BSC  
**Subject Code** 21CS41

**Subject Name** Mathematical Foundations for Computing

### Course Outcomes

- CO1 Apply the concepts of logic for effective computation and relating problems in the engineering domain
- CO2 Analyze the concepts of functions and relations to various fields of engineering. Comprehend the concepts of graph theory for various applications of computational sciences
- CO3 Apply discrete and continuous probability distributions in analyzing the probability models arising in the 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 distribution and demonstrate the validity of testing and hypothesis

**Course Code:** IPCC  
**Subject Code** 21CS42

**Subject Name** Design and Analysis of Algorithms

### Course Outcomes

- CO1 Explain the methods of analyzing the algorithms and to analyze performance of algorithms.
- CO2 State algorithm's efficiencies using asymptotic notations.
- CO3 Solve problems using algorithm design methods such as the brute force method, greedy method, divide and conquer, decrease and conquer, transform and conquer, dynamic programming, backtracking and branch and bound
- CO4 Choose the appropriate data structure and algorithm design method for a specified application
- CO5 Introduce P and NP classes.



**Course Code: IPCC**  
**Subject Code 21CS43**

**Subject Name Microcontroller and Embedded System**

## Course Outcomes

- CO1 Understand the fundamentals of ARM-based systems, including programming modules with registers and the CPSR.
- CO2 Use the various instructions to program the ARM controller.
- CO3 Program various embedded components using the embedded C program.
- CO4 Identify various components, their purpose, and their application to the embedded system's applicability.
- CO5 Understand the embedded system's real-time operating system and its application in IoT.

**Course Code: PCC**  
**Subject Code 21CS44**

**Subject Name Operating System**

## Course Outcomes

- CO1 Demonstrate the 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



**Course Code:** AEC  
**Subject Code** 21BE45

**Subject Name** Biology For Engineers

#### Course Outcomes

- CO1 Elucidate the basic biological concepts via relevant industrial applications and case studies
- CO2 Evaluate the principles of design and development, for exploring novel bioengineering projects
- CO3 Corroborate the concepts of biometrics for specific requirements
- CO4 Think critically towards exploring innovative bio based solutions for socially relevant problems

**Course Code:** PCC  
**Subject Code** 21CSL46

**Subject Name** Python Programming Laboratory

#### Course Outcomes

- CO1 Demonstrate the use of IDLE or PyCharm IDE to create Python Applications
- CO2 Using Python programming language to develop programs for solving real-world problems
- CO3 Implement the Object-Oriented Programming concepts in Python.
- CO4 Appraise the need for working with various documents like Excel, PDF, Word and Others
- CO5 Demonstrate regular expression using python programming



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**Course Code:** AEC  
**Subject Code** 21CSL481

**Subject Name** Web Programming

## Course Outcomes

- CO1 Learn Web tool box and history of web browsers.
- CO2 Learn HTML, XHTML tags with utilizations.
- CO3 Know CSS with dynamic document utilizations.
- CO4 Learn JavaScript with Element access in JavaScript.
- CO5 Logically plan and develop web pages.



## The COs of 21 Scheme subject wise

### V Semester

**Course Code:** BSC  
**Subject Code** 21CS51

**Subject Name** AUTOMATA THEORY AND COMPILER DESIGN

#### Course Outcomes

CO 1. Acquire fundamental understanding of the core concepts in automata theory and Theory of Computation

CO 2. Design and develop lexical analyzers, parsers and code generators

CO 3. Design Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers.

CO 4. Acquire fundamental understanding of the structure of a Compiler and Apply concepts automata theory and Theory of Computation to design Compilers

CO 5. Design computations models for problems in Automata theory and adaptation of such model in the field of compilers

**Course Code:** IPCC  
**Subject Code** 21CS52

**Subject Name** COMPUTER NETWORKS

#### Course Outcomes

CO 1. Learn the basic needs of communication system.

CO 2. Interpret the communication challenges and its solution.

CO 3. Identify and organize the communication system network components

CO 4. Design communication networks for user requirements.





**Course Code:** IPCC  
**Subject Code** 21CS53  
**Subject Name** DATABASE MANAGEMENT SYSTEMS

## Course Outcomes

- CO 1. Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS
- CO 2. Use Structured Query Language (SQL) for database manipulation and also demonstrate the basic of query evaluation.
- CO 3. Design and build simple database systems and *relate* the concept of transaction, concurrency control and recovery in database
- CO 4. Develop application to interact with databases, relational algebra expression.
- CO 5. Develop applications using tuple and domain relation expression from queries.

**Course Code:** PCC  
**Subject Code** 21CS534  
**Subject Name** ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

## Course Outcomes

- CO 1. Apply the knowledge of searching and reasoning techniques for different applications.
- CO 2. Have a good understanding of machine learning in relation to other fields and fundamental issues and challenges of machine learning.
- CO 3. Apply the knowledge of classification algorithms on various dataset and compare results
- CO 4. Model the neuron and Neural Network, and to analyze ANN learning and its applications.
- CO 5. Identifying the suitable clustering algorithm for different pattern



**Course Code:** PCC  
**Subject Code** 21CSL55  
**Subject Name** Database Management Systems Laboratory With Mini Project

## Course Outcomes

- CO 1. Create, Update and query on the database.
- CO 2. Demonstrate the working of different concepts of DBMS
- CO 3. Implement, analyze and evaluate the project developed for an application.

**Course Code:** AEC  
**Subject Code** 21CSL581  
**Subject Name** ANGULAR JS AND NODE JS

## Course Outcomes

- CO 1. Describe the features of Angular JS.
- CO 2. Recognize the form validations and controls.
- CO 3. Implement Directives and Controllers.
- CO 4. Evaluate and create database for simple application.
- CO 5. Plan and build webserver with node using Node .JS.

**Course Code:** AEC  
**Subject Code** 21CSL582  
**Subject Name** C# AND .NET FRAMEWORK

## Course Outcomes

- CO 1. Able to explain how C# fits into the .NET platform.
- CO 2. Describe the utilization of variables and constants of C#
- CO 3. Use the implementation of object-oriented aspects in applications.
- CO 4. Analyze and Set up Environment of .NET Core.
- CO 5. Evaluate and create a simple project application.



## VI Semester

**Course Code:** HSMC

**Subject Code** 21CS61

**Subject Name** SOFTWARE ENGINEERING & PROJECT MANAGEMENT

### Course Outcomes

CO 1. Understand the activities involved in software engineering and analyze the role of various process models

CO 2. Explain the basics of object-oriented concepts and build a suitable class model using modelling techniques

CO 3. Describe various software testing methods and to understand the importance of agile methodology and DevOps

CO 4. Illustrate the role of project planning and quality management in software development

CO 5. Understand the importance of activity planning and different planning models

**Course Code:** IPCC

**Subject Code** 21CS62

**Subject Name** FULLSTACK DEVELOPMENT

### Course Outcomes

CO 1. Understand the working of MVT based full stack web development with Django.

CO 2. Designing of Models and Forms for rapid development of web pages.

CO 3. Analyze the role of Template Inheritance and Generic views for developing full stack web applications.

CO 4. Apply the Django framework libraries to render nonHTML contents like CSV and PDF.

CO 5. Perform jQuery based AJAX integration to Django Apps to build responsive full stack web applications,



**Course Code:** PCC  
**Subject Code** 21IS63  
**Subject Name** SOFTWARE TESTING

## Course Outcomes

- CO 1. Explain the significance of software testing and quality assurance in software development
- CO 2. Apply the concepts of software testing to assess the most appropriate testing method.
- CO 3. Analyze the importance of testing in software development.
- CO 4. Evaluate the suitable testing model to derive test cases for any given software
- CO 5. Develop appropriate document for the software artefact.

**Course Code:** PEC  
**Subject Code** 21CS641  
**Subject Name** AGILE TECHNOLOGIES

## Course Outcomes

- CO 1. Understand the fundamentals of agile technologies
- CO 2. Explain XP Lifecycle, XP Concepts and Adopting XP
- CO 3. Apply different techniques on Practicing XP, Collaborating and Releasing
- CO 4. Analyze the Values and Principles of Mastering Agility
- CO 5. Demonstrate the agility to deliver good values



**Course Code:** PEC  
**Subject Code** 21CS642  
**Subject Name** ADVANCED JAVA PROGRAMMING

## Course Outcomes

- CO 1. Understanding the fundamental concepts of Enumerations and Annotations
- CO 2. Apply the concepts of Generic classes in Java programs
- CO 3. Demonstrate the concepts of String operations in Java
- CO 4. Develop web based applications using Java servlets and JSP
- CO 5. Illustrate database interaction and transaction processing in Java

**Course Code:** PEC  
**Subject Code** 21CS643  
**Subject Name** DATA MINING AND DATA WAREHOUSING

## Course Outcomes

- CO 1. Understand warehousing architectures and tools for systematically organizing large database and use their data to make strategic decisions.
- CO 2. Apply KDD process for finding interesting pattern from warehouse.
- CO 3. Analyze the kinds of patterns that can be discovered by association rule mining.
- CO 4. Evaluate interesting patterns from large amounts of data to analyze for predictions and classification.
- CO 5. Design select suitable methods for data mining and analysis.



**Course Code:** PEC  
**Subject Code** 21CS644  
**Subject Name** DATA SCIENCE AND VISUALIZATION

## Course Outcomes

- CO 1. Understand the data in different forms
- CO 2. Apply different techniques to Explore Data Analysis and the Data Science Process
- CO 3. Analyze feature selection algorithms & design a recommender system.
- CO 4. Evaluate data visualization tools and libraries and plot graphs.
- CO 5. Develop different charts and include mathematical expressions.

**Course Code:** OEC  
**Subject Code** 21CS651  
**Subject Name** INTRODUCTION TO DATA STRUCTURES

## Course Outcomes

- CO 1. Express the fundamentals of static and dynamic data structure.
- CO 2. Summarize the various types of data structure with their operations.
- CO 3. Interpret various searching and sorting techniques.
- CO 4. Choose appropriate data structure in problem solving.
- CO 5. Develop all data structures in a high level language for problem solving.



**Course Code:** OEC  
**Subject Code** 21CS652  
**Subject Name** INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS

## Course Outcomes

- CO 1. Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS
- CO 2. Use Structured Query Language (SQL) for database manipulation.
- CO 3. Design and build simple database systems
- CO 4. Develop application to interact with databases.

**Course Code:** OEC  
**Subject Code** 21CS653  
**Subject Name** INTRODUCTION TO CYBER SECURITY

## Course Outcomes

- CO 1. Describe the cyber crime terminologies
- CO 2. Analyze cybercrime in mobiles and wireless devices along with the tools for Cybercrime and prevention
- CO 3. Analyze the motive and causes for cybercrime, cybercriminals, and investigators
- CO 4. Apply the methods for understanding criminal case and evidence, detection standing criminal case and evidence.



**Course Code:** OEC  
**Subject Code** 21CS654  
**Subject Name** PROGRAMMING IN JAVA

## Course Outcomes

- CO 1. Develop JAVA programs using OOP principles and proper program structuring.
- CO 2. Develop JAVA program using packages, inheritance and interface.
- CO 3. Develop JAVA programs to implement error handling techniques using exception handling
- CO 4. Demonstrate string handling concepts using JAVA.

**Course Code:** OEC  
**Subject Code** 21CSL66  
**Subject Name** SOFTWARE TESTING LABORATORY

## Course Outcomes

- CO 1. List out the requirements for the given problem and develop test cases for any given problem .
- CO 2. Design and implement the solution for given problem and to design flow graph
- CO 3. Use Eclipse/NetBeans IDE and testing tools to design, develop, debug the Project and create appropriate document for the software artifact.
- CO 4. Use the appropriate functional testing strategies. Compare the different testing techniques.
- CO 5. Classify and Compare the problems according to a suitable testing model applying the test coverage metrics.