

**NEHRU MEMORIAL COLLEGE**  
**(AUTONOMOUS)**  
**NATIONALLY ACCREDITED WITH "A" GRADE BY**  
**NAAC**  
**PUTHANAMPATTI, TRICHY – 621007**



**DEPARTMENT OF COMPUTER APPLICATION**  
**(MCA)**

**COURSE OUTCOME (COS)**

Name of the Course	Course Outcome
<p align="center"><b>PROBLEM SOLVING USING C AND C++</b></p>	<p><b>CO1:</b> Interpret the syntax and semantics of C language for solving problems</p> <p><b>CO2:</b> Apply the concepts of functions, storage classes and array in real world problems</p> <p><b>CO3:</b> Develop programs using pointers and files</p> <p><b>CO4:</b> Describe the basic concepts of OOP paradigm</p> <p><b>CO5:</b> Develop C++ programs for friend functions, inheritance and polymorphism</p>
<p align="center"><b>PRINCIPLES OF OPERATING SYSTEM</b></p>	<p><b>CO1:</b> Describe the services provided by operating systems, system calls and the structure system.</p> <p><b>CO2:</b> Illustrate process description, mutual exclusion, deadlock detection and starvation.</p> <p><b>CO3:</b> Categorize the management of main, virtual memory and scheduling algorithms.</p> <p><b>CO4:</b> Describe I/O and file organization.</p> <p><b>CO5:</b> Recognize the concepts of Network operating system</p>
<p align="center"><b>DIGITAL DESIGN AND ARCHITECTURE</b></p>	<p><b>CO1:</b> Classify different types of data and representation of data</p> <p><b>CO2:</b> Design Combinational and Sequential digital functions</p> <p><b>CO3:</b> Explain an instruction set capable of performing a specified set of operations</p> <p><b>CO4:</b> Categorize modes of data transfer and Compare different ways of communication with I/O Devices</p> <p><b>CO5:</b> Distinguish Different types of memory</p>

<p><b>C &amp; C++ LAB</b></p>	<p><b>CO1:</b> Design algorithms for the given problem and Write programs in C and C++</p> <p><b>CO2:</b> Write C programs using pointers, Structures and unions</p> <p><b>CO3:</b> Implement C++ programs using OOPs concepts</p> <p><b>CO4:</b> Build C and C++ applications to solve any kind of real world problem</p>
<p><b>SHELL PROGRAMMING LAB</b></p>	<p><b>CO1:</b> Demonstrate the installation of OS and work with basic commands</p> <p><b>CO2:</b> Apply the basic commands to create scripts</p> <p><b>CO3:</b> Develop scripts for the given problem specification</p> <p><b>CO4:</b> Write a shell scripts to solve the real world problems</p>
<p><b>MATHEMATICAL FOUNDATION IN COMPUTER SCIENCE</b></p>	<p><b>CO1:</b> Apply consistency equations to solve matrix problems</p> <p><b>CO2:</b> Utilize mathematical logic to analyze theory of inference</p> <p><b>CO3:</b> Apply set theory concepts to work with relations</p> <p><b>CO4:</b> Represent lattices and its properties</p> <p><b>CO5:</b> Design map to get simplified form of Boolean function</p>
<p><b>HUMAN RESOURE MANAGEMENT</b></p>	<p><b>CO1:</b> Identify the concepts, functions and trends in HRM</p> <p><b>CO2:</b> Acquire the skills and knowledge of planning, recruitment, selection, placement and induction</p> <p><b>CO3:</b> Demonstrate the techniques for training and development</p>

<p><b>HUMAN RESOURE MANAGEMENT</b></p>	<p><b>CO4:</b> Understand the concept compensation, job evaluation and wage salary administration</p> <p><b>CO5:</b> Analyze the strategies to evaluate the performance of employees</p>
<p><b>PROGRAMING IN JAVA</b></p>	<p><b>CO1:</b> Identify the properties and features of Object Orientations using JAVA</p> <p><b>CO2:</b> Analyze the name space, Exception conditions standard library functions in JAVA using package and Exception handling.</p> <p><b>CO3:</b> Employ Utility and concurrency conditions in JAVA for complex and container types of problems</p> <p><b>CO4:</b> Apply Input / Output functions and java based applications with file manipulations, user interface and database connectivity.</p> <p><b>CO5:</b> Develop GUI and Network programming applications using swing and networking packages.</p>
<p><b>DATA BASE SYSTEM</b></p>	<p><b>CO1:</b> Understand the fundamentals of database system</p> <p><b>CO2:</b> Design and create tables in database and execute queries.</p> <p><b>CO3:</b> Design database based on a data models using normalization.</p> <p><b>CO4:</b> Apply transaction concept</p> <p><b>CO5:</b> Illustrate database system architecture and distributed database</p>

<b>DATA STRUCTURES AND ALGORITHMS</b>	<b>CO1:</b> Describe stack, queue and linked list operation. <b>CO2:</b> Choose appropriate data structure as applied to specified problem definition. <b>CO3:</b> Manipulate the operations on various data structures. <b>CO4:</b> Apply the concepts learned in algorithms to various domains <b>CO5:</b> Use linear and non-linear data structures
<b>COMPUTER NETWORKS</b>	<b>CO1:</b> Comprehend the basic types of networks, its classifications and properties of OSI and TCP/IP reference models <b>CO2:</b> Acquire the design of the Data Link Layer with Data Link layer Protocols. <b>CO3:</b> Apply various routing algorithms to find the shortest paths between two nodes. <b>CO4:</b> Recognize the Transport Layer with TCP/IP and UDP protocols. <b>CO5:</b> Investigate the Application Layer functionalities using Protocols like SNMP, WWW, FTP, MIME and security

<b>JAVA LAB</b>	<p><b>CO1:</b> Apply the concepts of Java to solve simple problems.</p> <p><b>CO2:</b> Develop, execute and troubleshoot programs using networking concepts.</p> <p><b>CO3:</b> Design and develop multi-tier applications using JDBC</p> <p><b>CO4:</b> Build simple applications using JAVA</p>
<b>DATA BASE LAB</b>	<p><b>CO1:</b> Design and implement database schema for the given problem</p> <p><b>CO2:</b> Populate and query using DDL,DML,DCL,TCL</p> <p><b>CO3:</b> Prepare SQL reports, create implicit and explicit cursor and implement triggers, procedures and function</p> <p><b>CO4:</b> Generate a normalized database for the given real life application</p>
<b>STATISTICS AND LINEAR PROGRAMMING</b>	<p><b>CO1:</b> Illustrate different types and functions of random variables and probability distributions</p> <p><b>CO2:</b> Apply discrete and continuous distributions to solve the given applications</p> <p><b>CO3:</b> Categorize and apply various types of hypothesis and errors</p> <p><b>CO4:</b> Employ regression and correlation to find the relation between variables and solve problems using time series analysis</p> <p><b>CO5:</b> Solve problems using linear programming techniques</p>

<p><b>SCRIPTING LANGUAGES(Java Script, JQuery, Angular JS, Node JS)</b></p>	<p><b>CO1:</b> Describe Java Script functionalities in creating web page</p> <p><b>CO2:</b> Develop pages using JQuery</p> <p><b>CO3:</b> Illustrate UI design and maintains it in database</p> <p><b>CO4:</b> Employ Nodjs to create server side application</p> <p><b>CO5:</b> Design effective UIs</p>
<p><b>WEB DESIGN AND DEVELOPMENT [PHP, MySQL, AJAX, JOOMLA]</b></p>	<p><b>CO1:</b> Summarize the technologies required for the web development</p> <p><b>CO2:</b> Develop simple programs using php</p> <p><b>CO3:</b> interpret MySQL functions with php to maintain the database</p> <p><b>CO4:</b> Relate Ajax with WAMP</p> <p><b>CO5:</b> Organize web site and publish through CMS</p>
<p><b>DATA MINING AND WAREHOUSING</b></p>	<p><b>CO1:</b> Preprocess the data using various preprocessing techniques</p> <p><b>CO2:</b> Generate association rules using Apriority and FP-growth algorithms</p> <p><b>CO3:</b> Predict the class label of a given tipples using the classification techniques</p> <p><b>CO4:</b> Group the data using the basic clustering techniques</p> <p><b>CO5:</b> Summarize the concepts of warehouse, its architecture and multidimensional data models.</p>
<p><b>SCRIPTING LAB</b></p>	<p><b>CO1:</b> Create UI designs with validations using JavaScript</p> <p><b>CO2:</b> Design and develop attractive web pages</p> <p><b>CO3:</b> Analyze and apply events and execute scripts with server</p> <p><b>CO4:</b> Build dynamic website using different scripting concepts</p>

<p><b>WEB DESIGN LAB</b></p>	<p><b>CO1:</b> Develop simple PHP scripts</p> <p><b>CO2:</b> Create simple web pages using HTML and PHP.</p> <p><b>CO3:</b> Design and develop interactive pages using HTML, PHP and MySQL</p> <p><b>CO4:</b> Build interactive web pages using PHP, MySQL, Ajax and JQuery.</p>
<p><b>ACCOUNTING AND FINANCIAL MANAGEMENT</b></p>	<p><b>CO1:</b> Recognize the basics of concepts and conventions of accounting</p> <p><b>CO2:</b> Apply accounting principles to practice the preparation of journal, ledger and Trail balance preparation</p> <p><b>CO3:</b> Identify the financial position of the business concern</p> <p><b>CO4:</b> Analyze budgeting and its control</p> <p><b>CO5:</b> Understand the concepts of capital budgeting</p>
<p><b>SERVICE ORIENTED ARCHITECTURE</b></p>	<p><b>CO1:</b> Illustrate the software architecture, enterprise wide SOA, SOA patterns and SOA programming models.</p> <p><b>CO2:</b> Analyze the design, technologies and benefits of SOA</p> <p><b>CO3:</b> Relate the technologies and describe the implementation of SOA and Amazon Web Services Components.</p> <p><b>CO4:</b> Explain the meta data management and web services security.</p> <p><b>CO5:</b> Analyze the transaction processing and web services security.</p>
<p><b>COMPUTER GRAPHICS</b></p>	<p><b>CO1:</b> Interpret two dimensional graphics.</p> <p><b>CO2:</b> Apply two dimensional transformations.</p> <p><b>CO3:</b> Analyze three dimensional graphics and</p> <p><b>CO4:</b> Apply three dimensional transformations.</p> <p><b>CO5:</b> Describe clipping techniques to graphics.</p>



<p style="text-align: center;"><b>MOBILE COMPUTING</b></p>	<p><b>CO1:</b> Explain mobile computing basics and technologies</p> <p><b>CO2:</b> Categorize WIFI standards and deployment of WIFI</p> <p><b>CO3:</b> Illustrate mobile network packet delivery and management</p> <p><b>CO4:</b> Summarize the protocols of transport layer over conventional transport layer</p> <p><b>CO5:</b> Justify different types of mobile OS.</p>
<p style="text-align: center;"><b>COMPETENCY BUILDING</b></p>	<p><b>CO1:</b> Develop simple console based games</p> <p><b>CO2:</b> Design and develop games using sequences</p> <p><b>CO3:</b> Demonstrate the usage of files and pattern matching</p> <p><b>CO4:</b> Apply OOP concepts in creating attractive games</p> <p><b>CO5:</b> Build interactive games using pygame</p>
<p style="text-align: center;"><b>DISTRIBUTED PROGRAMMING USING J2EE</b></p>	<p><b>CO1:</b> Identify distributed hardware and software architecture and distributed environment</p> <p><b>CO2:</b> Identify RMI architecture and Java Servlets, apply the same to develop various applications using RMI and Servlets</p> <p><b>CO3:</b> Apply the concepts of Java Server Pages to write various real time web based distributed applications</p> <p><b>CO4:</b> Build applications in J2EE server using Java Servlets and Java Server Pages using J2EE architecture</p> <p><b>CO5:</b> Design distributed applications that run on EJB server using Session and Entity bean with Enterprise Java Beans (EJB), its architecture</p>

<p><b>SOFTWARE ENGINEERING</b></p>	<p><b>CO1:</b> Explain various process models for a software project development</p> <p><b>CO2:</b> Classify the requirements and prepare SRS</p> <p><b>CO3:</b> Create architectural design, Data flow Design and procedural design</p> <p><b>CO4:</b> Estimate time, cost and effort for the specific software to be developed</p> <p><b>CO5:</b> Apply different testing techniques to test the software and Create test plans and strategies</p> <p><b>CO6:</b> Summarize various reengineering process and Quality concepts for quality assurance</p>
<p><b>GAME DEVELOPMENT LAB</b></p>	<p><b>CO1:</b> Design console based simple games</p> <p><b>CO2:</b> Analyze and develop game applications using sequences</p> <p><b>CO3:</b> Apply OOP concepts to develop game applications</p> <p><b>CO4:</b> Design and develop real world game applications using pygame</p>
<p><b>J2EE LAB</b></p>	<p><b>CO1:</b> Design various real time applications using RMI</p> <p><b>CO2:</b> Employ Java Servlets to develop various real time web based distributed applications.</p> <p><b>CO3:</b> Build applications in J2EE server using Java Server Pages</p> <p><b>CO4:</b> Design and develop distributed applications that run on EJB server using Session and Entity bean</p>

<p><b>INTERNET Of THINGS</b></p>	<p><b>CO1:</b> Analyze the basics of IoT  <b>CO2:</b> Interpret web services to access/control IoT devices  <b>CO3:</b> Apply an IoT in heterogeneous environment  <b>CO4:</b> Relate cloud services and IoT  <b>CO5:</b> Analyze applications of IoT in real time scenario</p>
<p><b>EMBEDDED SYSTEMS</b></p>	<p><b>CO1:</b> Interpret the components of embedded system  <b>CO2:</b> Classify various devices  <b>CO3:</b> Analyze functions of various units  <b>CO4:</b> Acquire the knowledge of real time operating system and implement real time functions  <b>CO5:</b> Understand embedded system development and tools</p>
<p><b>MACHINE LEARNING</b></p>	<p><b>CO1:</b> Identify learning problems, various concept learning methods  <b>CO2:</b> Outline the representation of neural networks and various algorithms  <b>CO3:</b> Describe bayes theorem, bayes optimal and naïve bayes classifier and Bayesian belief network  <b>CO4:</b> Interpret case based learning  <b>CO5:</b> Identify various advanced learning methods</p>
<p><b>CYBER SECURITY</b></p>	<p><b>CO1:</b> Infer Vulnerabilities in information systems and organization  <b>CO2:</b> Analyzing Risks and Securing them  <b>CO3:</b> Summarize the role and responsibilities of CIO  <b>CO4:</b> Describe IDPS and cyberspace defense  <b>CO5:</b> Distinguish cyber law and security</p>

<p><b>FUNCTIONAL PROGRAMMING</b></p>	<p><b>CO1:</b> Define algebraic data types and pattern matching</p> <p><b>CO2:</b> Describe functional programming</p> <p><b>CO3:</b> Illustrate file processing</p> <p><b>CO4:</b> Describe the functions of clojure</p> <p><b>CO5:</b> Predict macros and utilize Java and JVM</p>
<p><b>CODING SKILL</b></p>	<p><b>CO1:</b> Understand the Application Architecture, lifecycle, configuration files, etc.</p> <p><b>CO2:</b> Illustrate various application components like Activities, Fragments, and Content Provider etc.</p> <p><b>CO3:</b> Design the User Interface.</p> <p><b>CO4:</b> Write simple mobile applications.</p> <p><b>CO5:</b> Generate the APK and Publishing it on Android Market.</p>
<p><b>.NET PROGRAMMING</b></p>	<p><b>CO1:</b> Utilize the features of Dot Net Framework along with the features of C#</p> <p><b>CO2:</b> Apply ASP.NET to design web applications</p> <p><b>CO3:</b> Use ASP.NET controls in web applications.</p> <p><b>CO4:</b> Debug and deploy ASP.NET web applications</p> <p><b>CO5:</b> Create database driven ASP.NET web applications and web services</p>
<p><b>COMPILER DESIGN</b></p>	<p><b>CO1:</b> Classify various types of translators and its functions and identify phases of compiler</p> <p><b>CO2:</b> Design lexical analyzer and identify the similarities and differences among different parsing techniques</p> <p><b>CO3:</b> Formulate the different representation of intermediate code</p> <p><b>CO4:</b> Utilize parsers and symbol tables to identify errors from different phases</p> <p><b>CO5:</b> Explain the conversion of optimized code to object code.</p>

<p align="center"><b>MOBILE APPLICATION DEVELOPMENT LAB</b></p>	<p><b>CO1:</b> Design User Interface using various components</p> <p><b>CO2:</b> Implement applications with database</p> <p><b>CO3:</b> Write applications with multimedia objects</p> <p><b>CO4:</b> Build the given simple applications with action and alert dialogs</p>
<p align="center"><b>.NET LAB</b></p>	<p><b>CO1:</b> Design and develop user interfaces</p> <p><b>CO2:</b> Implement different controls</p> <p><b>CO3:</b> Create a database and access it using ADO.NET</p> <p><b>CO4:</b> Build simple web applications</p>
<p align="center"><b>CLOUD COMPUTING</b></p>	<p><b>CO1:</b> Recognize various types of clouds service and deployment models</p> <p><b>CO2:</b> Acquire cloud computing architecture</p> <p><b>CO3:</b> Identify and analyze basic cloud collaborating applications</p> <p><b>CO4:</b> Identify and Analyze advanced cloud collaborating applications</p> <p><b>CO5:</b> Summarize Cloud security and its importance to real time applications</p>
<p align="center"><b>DIGITAL IMAGE PROCESSING</b></p>	<p><b>CO1:</b> Explain the fundamentals of digital image</p> <p><b>CO2:</b> Apply various methods and techniques to enhance the image</p> <p><b>CO3:</b> Classify the techniques for filtering and segmentation</p> <p><b>CO4:</b> Classify compression, decompression techniques and standards.</p> <p><b>CO5:</b> Illustrate image representation and pattern matching</p>

<p><b>SOFTWARE TESTING</b></p>	<p><b>CO1:</b> Explain testing life cycle models  <b>CO2:</b> Distinguish different testing techniques  <b>CO3:</b> Illustrate test plans and test cases preparation  <b>CO4:</b> Apply the test cases to verify and validate the software product  <b>CO5:</b> Choose tools for test automation</p>
<p><b>BIG DATA ANALYTICS</b></p>	<p><b>CO1:</b> Analyze evolution and concepts of big data  <b>CO2:</b> Predict mining data from data sets using various methods and techniques  <b>CO3:</b> Outline Hadoop and Mapreduce functions and its environment  <b>CO4:</b> Explain different working principles of Mapreduce  <b>CO5:</b> Formulate Hadoop cluster and select appropriate tool</p>
<p><b>COMPUTER FORENSICS</b></p>	<p><b>CO1:</b> Describe forensics evolution, type and benefits  <b>CO2:</b> Explain the workstation selection and data acquisition  <b>CO3:</b> Handle file systems and registry  <b>CO4:</b> Analyze various tools  <b>CO5:</b> Familiar with different forensics and ethics</p>
<p><b>SOFTWARE PROJECT MANAGEMENT</b></p>	<p><b>CO1:</b> Explain conventional software management and software economics  <b>CO2:</b> Illustrate Project management framework  <b>CO3:</b> Describe process planning, project organizations and process automation  <b>CO4:</b> Familiar with software management disciplines  <b>CO5:</b> Identify various risk management policies</p>