

# GIET ENGINEERING COLLEGE

NH-16, CHAITANYA KNOWLEDGE CITY, RAJAMAHENDRAVARAM-533296  
COMPUTER SCIENCE AND ENGINEERING (R20)

<b>1<sup>st</sup> YEAR MCA COURSE OUTCOMES</b>	
<b>BUSINESS COMMUNICATION (MCA1101)</b>	
CO1	To acquaint the students with fundamentals of communication
CO2	Help students to honing oral.
CO3	To develop written and nonverbal communication skills
CO4	To transform them as effective communicators.
<b>MATHEMATICAL AND STATISTICAL FOUNDATIONS (MCA1102)</b>	
CO1	Apply the basic rules and theorems of probability theory such as Baye's Theorem, determine probabilities that help to solve engineering problems and to determine the expectation and variance of a random variable from its distribution.
CO2	Able to perform and analyze of sampling, means, proportions, variances and estimates the maximum likelihood based on population parameters.
CO3	Learn how to formulate and test hypotheses about sample means, variances and proportions and to draw conclusions based on the results of statistical tests.
CO4	Design various ciphers using number theory.
CO5	Apply graph theory for real time problems like network routing problem.
<b>COMPUTER ORGANIZATION &amp; OPERATING SYSTEMS (MCA1103)</b>	
CO1	Understand the basic organization of computer and different instruction formats and addressing modes
CO2	Analyze the concept of pipelining, segment registers and pin diagram of CPU.
CO3	Understand and analyze various issues related to memory hierarchy
CO4	Evaluate various modes of data transfer between CPU and I/O devices
CO6	To understand the services provided by a operating system and difficulties.
CO7	Services needed to be managed for a good operating system
<b>DATA STRUCTURES (MCA1104)</b>	
CO1	Implement basic programs by using C concepts.
CO2	Select the data structures that efficiently model the information in a problem
CO3	Assess efficiency trade-offs among different data structure implementations or combinations
CO4	Implement and know the application of algorithms for sorting and pattern matching.
<b>OBJECT ORIENTED PROGRAMMING WITH JAVA (MCA1105)</b>	
CO1	Describe the uses OOP concepts

CO2	Apply OOP concepts to solve real world problems
CO3	Distinguish the concept of packages and interfaces
CO4	Demonstrate the exception handling, multithread applications with synchronization
CO5	Design the GUI based applications using AWT and Swings
CO6	Discuss the Collection Framework
<b>OPERATING SYSTEMS AND LINUX LAB (MCA1106)</b>	
CO1	Implement various CPU scheduling algorithms and compare results
CO2	Implement various disk scheduling algorithms and compare results
CO3	Implement page replace algorithms
CO4	Implement various memory management techniques.
CO5	Execute basic Linux commands
<b>DATA STRUCTURES LAB (MCA1107)</b>	
CO1	Implement various basic data structures and its operations.
CO2	Apply sorting and searching algorithms to given numbers
CO3	Implement various tree operations.
CO4	Implement various graphs algorithms.
CO5	Develop applications using various data structures.
<b>JAVA PROGRAMMING LAB (MCA1108)</b>	
CO1	Apply OOP concepts to solve real world problems
CO2	Implement different forms of inheritance
CO3	Create packages and to reuse them.
CO4	Implement multi-threaded programs using synchronization concept
CO5	Create user defined exceptions
CO6	Design GUI applications using AWT and SWINGS.
<b>DATABASE MANAGEMENT SYSTEMS (MCA2101)</b>	
CO1	Illustrate the concept of databases, database management systems, database languages, database structures and their work
CO2	Apply ER modeling and Relational modeling for designing simple databases.
CO3	Summarize the concepts related to relational model and SQL and Write database queries using relational algebra and structured query language
CO4	Design and develop databases from the real world by applying the concepts of Normalization
CO5	Outline the issues associated with Transaction Management and Recovery, Tree Structured and Hash-Based Indexing
<b>COMPUTER NETWORKS (MCA2102)</b>	
CO1	Explain the network architecture, TCP/IP and OSI reference models

CO2	Identify and understand various techniques and modes of transmission
CO3	Demonstrate the data link protocols, multi-channel access protocols and IEEE 802 standards for LAN
CO4	Describe routing and congestion in network layer with routing algorithms and classify IPV4 addressing scheme
CO5	Discuss the elements and protocols of transport layer
CO6	Develop network security and define various protocols such as FTP, HTTP, Telnet, DNS
<b>SOFTWARE ENGINEERING AND DESIGN PATTERNS (MCA2103)</b>	
CO1	Define various software application domains and remember different process model used in software development.
CO2	Explain needs for software specifications also they can classify different types of software requirements and their gathering techniques.
CO3	Convert the requirements model into the design model and demonstrate use of software and user interface design principles
CO4	Illustrate the appropriate design patterns to solve object-oriented design problems
CO5	Apply structural patterns to solve design problems
CO6	Evaluate the design solutions by using behavioral patterns.
<b>DATA WAREHOUSING AND MINING (MCA2104)</b>	
CO1	Understand the basics of types of data, quality of data, suitable techniques required for preprocessing and measures required to perform data analysis
CO2	Describe the need of classification, identify suitable technique(s) to perform classification, model building and evaluation
CO3	Identify the requirements and usage of association rule mining on categorical and continuous data
CO4	Compare and Identify suitable clustering algorithm(s) (apply with open source tools), interpret, evaluate and report the result
CO5	Describe the requirements and the need of web mining
<b>NoSQL DATABASES (MCA2105)</b>	
CO1	Identify what type of NoSQL database to implement based on business requirements (key-value, document, full text, graph, etc.)
CO2	Apply NoSQL data modeling from application specific queries
CO3	Use Atomic Aggregates and denormalization as data modelling techniques to optimize query processing
<b>DESIGN AND ANALYSIS OF ALGORITHMS (MCA2105)</b>	
CO1	Describe asymptotic notation used for denoting performance of algorithms
CO2	Analyze the performance of a given algorithm and denote its time complexity using the asymptotic notation for recursive and non-recursive algorithms
CO3	List and describe various algorithmic approaches

CO4	Solve problems using divide and conquer, greedy, dynamic programming, backtracking and branch and bound algorithmic approaches
CO5	Apply graph search algorithms to real world problems
CO6	Demonstrate an understanding of NP- Completeness theory and lower bound theory
<b>MOBILE APPLICATION DEVELOPMENT (MCA2105)</b>	
CO1	Install and configure Android application development tools
CO2	Design and develop user Interfaces for the Android platform
CO3	Save state information across important operating system events
CO4	Apply Java programming concepts to Android application development
<b>ARTIFICIAL INTELLIGENCE (MCA2105)</b>	
CO1	Outline problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem
CO2	Apply the language/framework of different AI methods for a given problem
CO3	Implement basic AI algorithms
CO4	Design and carry out an empirical evaluation of different algorithms on problem formalization and state the conclusions that the evaluation supports
<b>ACCOUNTING FOR MANAGERS (MCA2105)</b>	
CO1	The Learner can prepare Financial Statements and the usage of various accounting tools for Analysis and to evaluate various techniques for decision making.
CO2	Students will develop the ability to interpret financial statements, analyze key financial ratios, and make informed decisions based on financial data.
CO3	Students will gain expertise in the development and management of budgets, focusing on cost control and performance measurement.
CO4	Students will acquire effective communication skills for conveying financial information to non-financial stakeholders.
<b>DBMS LAB (MCA2106)</b>	
CO1	Utilize SQL to execute queries for creating database and performing data manipulation operations
CO2	Examine integrity constraints to build efficient databases
CO3	Apply Queries using Advanced Concepts of SQL
CO4	Build PL/SQL programs including stored procedures, functions, cursors and triggers
<b>COMPUTER NETWORKS LAB (MCA2107)</b>	
CO1	Students will demonstrate the ability to configure and troubleshoot computer networks, including routers, switches, and various network devices.
CO2	Students will acquire practical skills in implementing and evaluating network security measures.
CO3	Students will develop a deep understanding of network protocols and their functions.
CO4	Students will design and optimize computer networks to meet specific requirements.

<b>SOFTWARE ENGINEERING AND DESIGN PATTERNS LAB (MCA2108)</b>	
CO1	Students will gain proficiency in creating effective software designs using industry-standard modeling techniques.
CO2	Students will learn and apply design patterns to address common software design challenges
CO3	Students will develop collaborative software development skills by working in teams to design, implement, and test software projects.
CO4	Students will acquire skills in quality assurance and testing throughout the software development life cycle.
<b>EMPLOYABILITY SKILLS (MCA2109)</b>	
CO1	Recite the soft skills
CO2	Make presentations effectively with appropriate body language
CO3	Be composed with positive attitude
CO4	Apply their core competencies to succeed in professional and personal life
<b>2<sup>nd</sup> YEAR MCA COURSE OUTCOMES</b>	
<b>MACHINE LEARNING WITH PYTHON (MCA3101)</b>	
CO1	Illustrate and comprehend the basics of Machine Learning with Python
CO2	Demonstrate the algorithms of Supervised Learning and be able to differentiate linear and logistic regressions
CO3	Demonstrate the algorithms of Unsupervised Learning and be able to understand the clustering algorithms
CO4	Evaluate the concepts of binning, pipeline Interfaces with examples
CO5	Apply the sentiment analysis for various case studies
<b>INTERNET OF THINGS (MCA3102)</b>	
CO1	Explain the definition and usage of the term 'the internet of things' in different contexts
CO2	Discover the various network protocols used in IoT
CO3	Define the role of big data, cloud computing and data analytics in a typical IoT system.
CO4	Compare and contrast the threat environment based on industry and/or device type
CO5	Design a simple IoT system made up of sensors, wireless network connection, data analytics and display/actuators, and write the necessary control software
<b>WEB TECHNOLOGIES (MCA3103)</b>	
CO1	Analyze a web page and identify its elements and attributes.
CO2	To acquire knowledge of xml fundamentals and usage of xml technology in electronic data interchange.
CO3	Build dynamic web pages using JavaScript (client-side programming).

CO4	To design and develop web-based enterprise systems for the enterprises using technologies like jsp, servlet.
CO5	Build web applications using PHP
<b>CRYPTOGRAPHY AND NETWORK SECURITY (MCA3104)</b>	
CO1	Explain Basic Principles, different security threats, countermeasures, foundation course of cryptography mathematics and Symmetric Encryption.
CO2	Classify the basic principles of Asymmetric key algorithms and operations of asymmetric key cryptography.
CO3	Design Cryptographic Hash Functions as SHA-3 and Digital Signatures as Elgamal
CO4	Explain the concept of Key Management and Distribution and User Authentication
CO5	Determine the knowledge of Network and Internet Security Protocols such as S/MIME
<b>SOFT COMPUTING (MCA3105)</b>	
CO1	Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.
CO2	Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic
CO3	To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations
CO4	Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications
CO5	Reveal different applications of these models to solve engineering and other problems.
<b>SOFTWARE PROJECT MANAGEMENT (MCA3105)</b>	
CO1	Apply the process to be followed in the software development life-cycle models
CO2	Apply the concepts of project management & planning
CO3	Implement the project plans through managing people, communications, and change
CO4	Conduct activities necessary to successfully complete and close the Software projects
CO5	Implement communication, modeling, and construction & deployment practices in software development
<b>CLOUD COMPUTING (MCA3105)</b>	
CO1	Interpret the key dimensions of the challenge of Cloud Computing
CO2	Examine the economics, financial, and technological implications for selecting cloud computing for own organization
CO3	Evaluate own organizations' needs for capacity building and training in cloud computing-related IT areas
CO4	Illustrate Virtualization for Data-Center Automation
CO5	Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications
CO6	Interpret the key dimensions of the challenge of Cloud Computing.

<b>OPTIMIZATION TECHNIQUES (MCA3105)</b>	
CO1	Describe clearly a problem, identify its parts and analyze the individual functions
CO2	Feasibility study for solving an optimization problem
CO3	Becoming a mathematical translation of the verbal formulation of an optimization problem
CO4	To design algorithms, the repetitive use of which will lead reliably to finding an approximate solution
CO5	Discovery, study and solve optimization problems
CO6	Investigate, study, develop, organize and promote innovative solutions for various applications
<b>CYBER SECURITY (MCA3105)</b>	
CO1	Students will demonstrate a thorough understanding of network security principles and practices.
CO2	Students will gain practical skills in identifying and assessing vulnerabilities in computer systems and networks
CO3	Students will be equipped to respond effectively to cybersecurity incidents and conduct digital forensics investigations.
CO4	Students will understand the importance of cybersecurity policies and compliance frameworks.
<b>MACHINE LEARNING WITH PYTHON LAB (MCA3106)</b>	
CO1	Implement procedures for the machine learning algorithms
CO2	Design Python programs for various Learning algorithms
CO3	Apply appropriate data sets to the Machine Learning algorithms
CO4	Identify and apply Machine Learning algorithms to solve real world problems
<b>IoT LAB (MCA3107)</b>	
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
<b>WEB TECHNOLOGIES LAB (MCA3108)</b>	
CO1	Create dynamic and interactive web pages using HTML, CSS & Java Script
CO2	Experiment with Learn and implement XML concept
CO3	Show the Install Tomcat Server and execute client-server programs
CO4	Implement programs using Ruby programming

CO4	Develop web applications using PHP
<b>DIGITAL MARKETING (MCA4101)</b>	
CO1	Explain about web pages with basic HTML5, DHTML tags using CSS and XML, the overview of W3C DOM.
CO2	Discuss the key elements of a digital Java Scripts.
CO3	Apply search engine optimization techniques to a website.
CO4	Illustrate how the effectiveness of a digital marketing campaign can be measured.
CO5	Demonstrate advanced practical skills in common digital marketing tools such as SEO, SEM social media and Blogs.
<b>HUMAN RESOURCE MANAGEMENT (MCA4101)</b>	
CO1	Explain the importance of human resources and their effective management in organizations
CO2	Demonstrate a basic understanding of different tools used in forecasting and planning, human resource need.
CO3	Describe the meanings of terminology and tools used in managing employees effectively
CO4	Make use of Record governmental regulations affecting employees and employers.
CO4	Analyze the key issues related to administering the human elements such as motivation, compensation, appraisal, career planning, diversity, ethics, and training
<b>DEEP LEARNING (MCA4101)</b>	
CO1	Demonstrate the mathematical foundation of neural network
CO2	Describe the machine learning basics
CO3	Compare the different architectures of deep neural network
CO4	Build a convolutional neural network
CO5	Build and train RNN and LSTMs
<b>AD-HOC AND SENSOR NETWORKS (MCA4101)</b>	
CO1	Evaluate the principles and characteristics of mobile ad hoc networks (MANETs) and what distinguishes them from infrastructure-based networks
CO2	Determine the principles and characteristics of wireless sensor networks
CO3	Discuss the challenges in designing MAC, routing and transport protocols for wireless ad-hoc sensor networks
CO4	Illustrate the various sensor network Platforms, tools and applications
CO5	Demonstrate the issues and challenges in security provisioning and also familiar with the mechanisms for implementing security and trust mechanisms in MANETs and WSNs
<b>NETWORK PROGRAMMING (MCA4102)</b>	
CO1	Explain OSI Model and Standard Internet Protocol.
CO2	Acquire the knowledge of Elementary TCP sockets and I/O Multiplexing and socket



CO3	Demonstrate the concepts of FIFOs streams messages and Remote logins.
CO4	How to handle server process termination
<b>BLOCK CHAIN TECHNOLOGIES (MCA4102)</b>	
CO1	Demonstrate the foundation of the Blockchain technology and understand the processes in payment and funding.
CO2	Identify the risks involved in building Blockchain applications.
CO3	Review of legal implications using smart contracts.
CO4	Choose the present landscape of Blockchain implementations and Understand Cryptocurrency markets.
CO5	Examine how to profit from trading cryptocurrencies
<b>SOFTWARE TESTING METHODOLOGIES (MCA4102)</b>	
CO1	Identify and understand various software testing problems, apply software testing knowledge and engineering methods, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.
CO2	Design and conduct a software test process for a software project
CO3	Analyze the needs of software test automation
CO4	Use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects
CO4	Basic understanding and knowledge of contemporary issues in software testing, such as component-based, web based and object-oriented software testing problems
CO5	Write test cases for given software to test it before delivery to the customer and write test scripts for both desktop and web-based applications
<b>BIG DATA ANALYTICS (MCA4102)</b>	
CO1	Identify the need-based tools, viz., Pig and Hive and to handle and formulate an effective strategy to implement a successful Data analytics project
CO2	Organize the existing technologies and the need of distributed files systems to analyze the big data
CO3	To Discuss the cluster and classification techniques
CO4	Analyze the concepts of stream memory and spark models.
CO5	Explain the use of NoSQL database in data analytics.