**Malineni Lakshmaiah Women's Engineering College :: Guntur**
Approved by AICTE, New Delhi, Affiliated to JNTUK, Kakinada
Pulladigunta (Vil), Vatticherukuru (Md), Prathipadu Road, Guntur – 522 017
A.P.

**DEPARTMENT OF INFORMATION TECHNOLOGY**

## 3.1.1 Course Outcomes:

| Course Outcomes for First Year First Semester Course | | |
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| **Course Title with Code** | **CO'S** | **Statement** |
| C101 English | CO1 | understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information |
| | CO2 | ask and answer general questions on familiar topics and introduce oneself/others |
| | CO3 | employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information |
| | CO4 | recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs |
| | CO5 | form sentences using proper grammatical structures and correct word forms |
| C102 Mathematics - I | CO1 | Utilize mean value theorems to real life problems |
| | CO2 | Solve the differential equations related to various engineering fields |
| | CO3 | Familiarize with functions of several variables which is useful in optimization |
| | CO4 | Apply double integration techniques in evaluating areas bounded by region (L3) |
| | CO5 | Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional and 3-dimensional coordinate systems (L5 ) |
| C103 Applied Chemistry | CO1 | Explain the preparation, properties and applications of the rmoplastics, thermo settings, elastomers and conducting polymers |
| | CO2 | Know the importance of various materials and their uses in the construction of batteries and fuel cells. |
| | CO3 | To acquire the knowledge of nano-materials, refractories,lubricants and cement |
| | CO4 | Assess the quality of various fuels. |
| | CO5 | Understand the importance of water andits usage in various industries. |

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| C104<br>Fundamentals of Computer Science | CO1 | Illustrate the concept of input and output devices of Computers and how it works and recognize the basic terminology used in computer programming. |
| | CO2 | Recognize the Computer networks, types of networks and topologies. |
| | CO3 | Summarize the concepts of Operating Systems and Databases. |
| | CO4 | Recite the Advanced Computer Technologies like Distributed Computing & Wireless<br>Networks. |
| | | Recite the Advanced Computer Technologies like Distributed Computing & Wireless Networks |
| C105<br>Engineering Drawing | CO1 | The student will learn how to visualize 2D & 3D objects. |
| C106<br>English Lab | CO1 | identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English and speak clearly on a specific topic using suitable discourse markers in informal discussions (L3) |
| | CO2 | take notes while listening to a talk/lecture; to answer questions in English; formulate sentences using proper grammatical structures and correct word forms; and use language effectively in competitive examinations (L3) |
| | CO3 | Write summaries based on global comprehension of reading/listening texts; produce a coherent write-up interpreting a figure/graph/chart/table; and use English as a successful medium of communication. |
| C107<br>Applied Chemistry Lab | CO1 | Estimate the amount of metal ions present in different solutions(L5) |
| | CO2 | Analyze the quality parameters of water (L4) |
| | CO3 | Determine the strength of different solutions by using different instrumentation techniques (L5) |
| C108<br>IT Workshop | CO1 | Assemble and disassemble components of a PC |
| | CO2 | Construct a fully functional virtual machine, Summarize various Linux operating system commands, |
| | CO3 | Secure a computer from cyber threats, Learn and practice programming skill in Github, Hackerrank, Codechef, and HackerEarth etc. |
| | CO4 | Recognize characters & extract text from scanned images, Create audio files and podcasts |
| | CO5 | Create video tutorials and publishing, Use office tools for documentation, Build interactive presentations, Build websites, Create quizzes & analyze responses. |

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| C109 Environmental Science | CO1 | Able to Understand The concepts of the ecosystem |
| | CO2 | Able to Understand The natural resources and their importance |
| | CO3 | Able to learn The biodiversity of India and the threats to bio diversity, and Apply conservation practices |
| | CO4 | Able to learn Various attributes o the pollution and their impacts |
| | CO5 | Able to Understand Social issues both rural and urban environment |
| | CO6 | Able to Understand About environmental Impact assessment and Evaluate the stages involved in EIA |
| C110 Mathematics – II | CO1 | develop the use of matrix algebra techniques that is needed by engineers for practical applications |
| | CO2 | solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel |
| | CO3 | evaluate approximating the roots of polynomial and transcendental equations by different algorithms |
| | CO4 | apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals |
| | CO5 | apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations |
| C111 Mathematics – III | CO1 | Interpret the physical meaning of different operators such as gradient, curl and divergence (L5) |
| | CO2 | Estimate the work done against a field, circulation and flux using vector calculus (L5) |
| | CO3 | Apply the Laplace transform for solving differential equations (L3) |
| | CO4 | Find or compute the Fourier series of periodic signals (L3) |
| | CO5 | Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms (L3) |
| | CO6 | Identify solution methods for partial differential equations that model physical processes |
| C112 Applied Physics | CO1 | Explain the concept of polarization in dielectric materials. |
| | CO2 | summarize various types of polarization of dielectrics |
| | CO3 | interpret Lorentz field and Claussius- Mosotti relation in dielectrics. |
| | CO4 | classify the magnetic materials based on susceptibility and their temperature dependence. |
| | CO5 | explain the applications of dielectric and magnetic materials . |

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| | CO6 | Apply the concept of magnetism to magnetic devices. |
| C113<br>Programming for Problem Solving using C | CO1 | To write algorithms and to draw flowcharts for solving problems |
| | CO2 | To convert flowcharts/algorithms to C Programs, compile and debug programs |
| | CO3 | To use different operators, data types and write programs that use two-way/ multi-way<br>selection |
| | CO4 | To select the best loop construct for a given problem |
| | CO5 | To design and implement programs to analyze the different pointer applications |
| | CO6 | To decompose a problem into functions and to develop modular reusable code |
| | CO7 | To apply File I/O operations |
| C114<br>Digital Logic Design | CO1 | An ability to define different number systems, binary addition and subtraction, 2's<br>complement representation and operations with this representation. |
| | CO2 | An ability to understand the different switching algebra theorems and apply them for<br>logic functions. |
| | CO3 | An ability to define the Karnaugh map for a few variables and perform an algorithmic<br>Reduction of logic functions. |
| | CO4 | Students will be able to design various logic gates starting from simple ordinary gates to complex programmable logic devices & arrays. |
| | CO5 | Students will be able to design various sequential circuits starting from flip-flop to registers and counters. |
| C115<br>Applied Physics Lab | CO1 | Operate optical instruments like micro scope and spectrometer (L2) |
| | CO2 | Determine thickness of apaper with the concept of interference (L2) |
| | CO3 | Estimate the wave length of different colors using diffraction grating and resolving power(L2) |
| | CO4 | Plot the intensity of them a gnetic field of circular coilc arryingc urrent with distance(L3) |
| | CO5 | Determine magnetic susceptibility of them at erial and its losses byB-Hcurve(L3) |

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| | CO6 | Determine the resistivity of the given semi conductor using four probe method (L3) |
| | CO7 | Identify the type of semi conductor., n-type or p-type using hall effect (L3) |
| | CO8 | Calculate the band gap of a given semiconductor(L3) |
| C116 Communication Skills Lab | CO1 | Prioritize information from reading texts after selecting relevant and useful points(L3) |
| | CO2 | Paraphrase short academic texts using suitable strategies and conventions (L3) |
| | CO3 | Make formal structured presentations on academic topics using PPT slides with relevant graphical elements (L3) |
| | CO4 | Participateingroupdiscussions using appropriate conventions and language strategies (L3) |
| | CO5 | prepare a CV with a cover letter to seek ternship/job(L2) collaborate with a partner to make presentations and Project Reports(L2) |
| C117 Programming for Problem Solving using C Lab | CO1 | Gains Knowledge on various concepts of a C language. |
| | CO2 | Able to draw flowcharts and write algorithms. |
| | CO3 | Able design and development of C problem solving skills. |
| | CO4 | Able to design and develop modular programming skills. |
| | CO5 | Able to trace and debug a program |
| C118 Engineering Exploration Project | CO1 | Application of Engineering Principles |
| | CO2 | Design and Prototyping |
| | CO3 | Problem Identification and Solution Development |
| | CO4 | Experimentation and Testing |
| | CO5 | Teamwork and Collaboration |
| | CO6 | Communication and Reporting |
| | CO7 | Ethical, Environmental, and Societal Considerations |
| | CO8 | Innovation and Creativity |

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| C119<br>Constitution of India | CO1 | Understand historical background of the constitution making and its importance for building a democratic India. |
| | CO2 | Understand the functioning of three wings of the government i.e., executive, legislative and judiciary. |
| | CO3 | Understand the value of the fundamental rights and duties for becoming good citizen of India. |
| | CO4 | Analyze the decentralization of power between central, state and local self-government. |
| | CO5 | Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy. |
| C201<br>Mathematical Foundations of Computer Science | CO1 | Demonstrate skills in solving mathematical problems |
| | CO2 | Comprehend mathematical principles and logic |
| | CO3 | Demonstrate knowledge of mathematical modeling and proficiency in using mathematical<br>software |
| | CO4 | Manipulate and analyze data numerically and/or graphically using appropriate Software |
| | CO5 | Communicate effectively mathematical ideas/results verbally or in writing |
| C202<br>Software Engineering | CO1 | Ability to transform an Object-Oriented Design into high quality, executable code |
| | CO2 | Skills to design, implement, and execute test cases at the Unit and Integration level |
| | CO3 | Compare conventional and agile software methods |
| C203<br>Python Programming | CO1 | Develop essential programming skills in computer programming concepts like data types,<br>containers |
| | CO2 | Apply the basics of programming in the Python language |
| | CO3 | Solve coding tasks related conditional execution, loops |
| | CO4 | Solve coding tasks related to the fundamental notions and techniques used in object oriented programming |
| C204<br>Data Structures | CO1 | Summarize the properties, interfaces, and behaviors of basic abstract data types |
| | CO2 | Discuss the computational efficiency of the principal algorithms for sorting & searching |
| | CO3 | Use arrays, records, linked structures, stacks, queues, trees, and Graphs in writing programs |
| | CO4 | Demonstrate different methods for traversing trees |
| C205<br>Object Oriented Programming through C++ | CO1 | Classify object oriented programming and procedural programming |
| | CO2 | Apply C++ features such as composition of objects, operator overloads, dynamic memory<br>allocation, inheritance and polymorphism, file I/O, exception handling |

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| | CO3 | Build C++ classes using appropriate encapsulation and design principles |
| | CO4 | Apply object oriented or non-object oriented techniques to solve bigger computing problems |
| C206 Computer Organization | CO1 | Develop a detailed understanding of computer systems |
| | CO2 | Cite different number systems, binary addition and subtraction, standard, floating-point, and micro operations |
| | CO3 | Develop a detailed understanding of architecture and functionality of central processing unit |
| | CO4 | Exemplify in a better way the I/O and memory organization |
| | CO5 | Illustrate concepts of parallel processing, pipelining and inter processor communication |
| C207 Python Programming Lab | CO1 | Write, Test and Debug Python Programs |
| | CO2 | Use Conditionals and Loops for Python Programs |
| | CO3 | Use functions and represent Compound data using Lists, Tuples and Dictionaries |
| | CO4 | Use various applications using python |
| C208 Data Structures through C++ Lab | CO1 | Apply the various OOPs concepts with the help of programs |
| | CO2 | Use basic data structures such as arrays and linked list. |
| | CO3 | Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths |
| | CO4 | Use various searching and sorting algorithms |
| C209 Essence of Indian Traditional Knowledge | CO1 | Understand the concept of Traditional knowledge and its importance |
| | CO2 | Know the need and importance of protecting traditional knowledge |
| | CO3 | Know the various enactments related to the protection of traditional knowledge |
| | CO4 | Understand the concepts of Intellectual property to protect the traditional knowledge |
| C210 Employability Skills- I* | CO1 | Establish effective communication with employers, supervisors, and co-workers |
| | CO2 | Identify to explore their values and career choices through individual skill assessments |
| | CO3 | Adapts positive attitude and appropriate body language |
| | CO4 | Interpret the core competencies to succeed in professional and personal life |

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| C211<br>Probability and Statistics | CO1 | Classify the concepts of data science and its importance (L4) or (L2) |
| | CO2 | Interpret the association of characteristics and through correlation and regression tools<br>(L4) |
| | CO3 | Make use of the concepts of probability and their applications (L3) |
| | CO4 | Apply discrete and continuous probability distributions (L3) |
| | CO5 | Design the components of a classical hypothesis test (L6) |
| | CO6 | Infer the statistical inferential methods based on small and large sampling tests (L4) |
| C212<br>Java Programming | CO1 | Able to realize the concept of Object Oriented Programming & Java Programming Constructs |
| | CO2 | Able to describe the basic concepts of Java such as operators, classes, objects, inheritance, packages, Enumeration and various keywords |
| | CO3 | Apply the concept of exception handling and Input/ Output operations |
| | CO4 | Able to design the applications of Java & Java applet |
| | CO5 | Able to Analyze & Design the concept of Event Handling and Abstract Window Toolkit |
| C213<br>Operating Systems | CO1 | Describe various generations of Operating System and functions of Operating System |
| | CO2 | Describe the concept of program, process and thread and analyze various CPU Scheduling Algorithms and compare their performance |
| | CO3 | Solve Inter Process Communication problems using Mathematical Equations by various methods |
| | CO4 | Compare various Memory Management Schemes especially paging and Segmentation in Operating System and apply various Page Replacement Techniques |
| | CO5 | Outline File Systems in Operating System like UNIX/Linux and Windows |
| C214<br>Database Management Systems | CO1 | Describe a relational database and object-oriented database |
| | CO2 | Create, maintain and manipulate a relational database using SQL |
| | CO3 | Describe ER model and normalization for database design |

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| | CO4 | Examine issues in data storage and query processing and can formulate appropriate solutions |
| | CO5 | Outline the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage |
| C215 Formal Languages and Automata Theory | CO1 | Classify machines by their power to recognize languages. |
| | CO2 | Summarize language classes & grammars relationship among them with the help of Chomsky hierarchy |
| | CO3 | Employ finite state machines to solve problems in computing |
| | CO4 | Illustrate deterministic and non-deterministic machines |
| | CO5 | Quote the hierarchy of problems arising in the computer science |
| C216 Java Programming Lab | CO1 | Evaluate default value of all primitive data type, Operations, Expressions, Control-flow, Strings |
| | CO2 | Determine Class, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism |
| | CO3 | Illustrating simple inheritance, multi-level inheritance, Exception handling mechanism |
| | CO4 | Construct Threads, Event Handling, implement packages, developing applets |
| C217 UNIX Operating System Lab | CO1 | To use Unix utilities and perform basic shell control of the utilities |
| | CO2 | To use the Unix file system and file access control |
| | CO3 | To use of an operating system to develop software |
| | CO4 | Students will be able to use Linux environment efficiently |
| | CO5 | Solve problems using bash for shell scripting |
| C218 Database Management Systems Lab | 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 |
| C219 Professional Ethics & Human Values | CO1 | Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field |
| | CO2 | Identify the multiple ethical interests at stake in a real-world situation or practice |
| | CO3 | Articulate what makes a particular course of action ethically defensible |
| | CO4 | Assess their own ethical values and the social context of problems |
| | CO5 | Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the |

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| | | objective presentation of data, and the treatment of human subjects |
| | CO6 | Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work |
| | CO7 | Integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research. |
| C220 Socially Relevant Project* | CO1 | Use scientific reasoning to gather, evaluate, and interpret ideas |
| | CO2 | Analyze and design solutions to solve the ideas |
| | CO3 | Use one or more creative tools to complete the projects |
| C301 Data Warehousing and Data Mining | CO1 | Design a Data warehouse system and perform business analysis with OLAP tools |
| | CO2 | Apply suitable pre-processing and visualization techniques for data analysis |
| | CO3 | Apply frequent pattern and association rule mining techniques for data analysis |
| | CO4 | Apply appropriate classification techniques for data analysis |
| | CO5 | Apply appropriate clustering techniques for data analysis |
| C302 Computer Networks | CO1 | Illustrate the OSI and TCP/IP reference model |
| | CO2 | Analyze MAC layer protocols and LAN technologies |
| | CO3 | Design applications using internet protocols |
| | CO4 | Implement routing and congestion control algorithms |
| | CO5 | Develop application layer protocols |
| C303 Compiler Design | CO1 | Design, develop, and implement a compiler for any language |
| | CO2 | Use LEX and YACC tools for developing a scanner and a parser |
| | CO3 | Design and implement LL and LR parsers |
| | CO4 | Design algorithms to perform code optimization in order to improve the performance of a program in terms of space and time complexity |
| | CO5 | Apply algorithms to generate machine code |
| C304 Artificial Intelligence | 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 |

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| | CO3 | Implement basic AI algorithms- standard search algorithms or dynamic programming |
| | CO4 | Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports |
| C305 Software Testing Methodologies | 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 |
| | CO5 | Basic understanding and knowledge of contemporary issues in software testing, such as component-based, web based and object oriented software testing problems |
| | CO6 | 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 |
| C306 Computer Networks Lab | CO1 | Apply the basics of Physical layer in real time applications |
| | CO2 | Apply data link layer concepts, design issues, and protocols |
| | CO3 | Apply Network layer routing protocols and IP addressing |
| | CO4 | Implement the functions of Application layer and Presentation layer paradigms and Protocol |
| C307 AI Tools & Techniques Lab | CO1 | Identify problems that are amenable to solution by AI methods |
| | CO2 | Identify appropriate AI methods to solve a given problem |
| | CO3 | Use language/framework of different AI methods for solving problems |
| | CO4 | Implement basic AI algorithms |
| | CO5 | Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports |
| C308 Data Mining Lab | CO1 | Extend the functionality of R by using add-on packages |
| | CO2 | Examine data from files and other sources and perform various data manipulation tasks on them |
| | CO3 | Code statistical functions in R |
| | CO4 | Use R Graphics and Tables to visualize results of various statistical operations on data |

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| | CO5 | Apply the knowledge of R gained to data Analytics for real life applications |
| C309 Employability Skills - II* | CO1 | Recite the corporate etiquette |
| | 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 |
| C310 Web Technologies | CO1 | Illustrate the basic concepts of HTML and CSS & apply those concepts to design static web pages |
| | CO2 | Identify and understand various concepts related to dynamic web pages and validate them using JavaScript |
| | CO3 | Outline the concepts of Extensible markup language & AJAX |
| | CO4 | Develop web Applications using Scripting Languages & Frameworks |
| | CO5 | Create and deploy secure, usable database driven web applications using PHP and RUBY |
| C311 Distributed Systems | CO1 | Elucidate the foundations and issues of distributed systems |
| | CO2 | Elucidate the foundations and issues of distributed systems |
| | CO3 | Illustrate the Mutual Exclusion and Deadlock detection algorithms in distributed systems |
| | CO4 | Describe the agreement protocols and fault tolerance mechanisms in distributed systems |
| | CO5 | Describe the features of peer-to-peer and distributed shared memory systems |
| C312 Design and Analysis of Algorithms | 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 |
| C313 PE-II –Information Retrieval System | CO1 | Understanding of Information Retrieval Fundamentals |
| | CO2 | Implementation of Search Algorithms |
| | CO3 | Use of Data Structures in Information Retrieval |

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| | CO4 | Evaluation of Information Retrieval Systems |
| | CO5 | Use of Databases and NoSQL in Information Retrieval |
| C314<br>OE-1-Principles of Communication | CO1 | Understand Communication Models and Theories |
| | CO2 | Develop Verbal and Non-Verbal Communication Skills |
| | CO3 | Write Clear and Concise Messages |
| | CO4 | Communicate Effectively in Professional and Team Settings |
| | CO5 | Understand Ethical and Cultural Considerations in Communication |
| C315<br>MEFA | CO1 | Understand the Basic Principles of Managerial Economics and Apply Them to Business Decisions |
| | CO2 | Analyze the Impact of Market Structures on Pricing and Output Decisions |
| | CO3 | Utilize Financial Analysis Tools to Assess the Performance and Viability of Business Decisions |
| | CO4 | Apply Cost-Volume-Profit (CVP) Analysis for Decision-Making in Pricing and Production |
| | CO5 | Evaluate Investment Projects Using Capital Budgeting Techniques |
| C316<br>Web Technologies Lab | CO1 | Design and Develop Static Web Pages Using HTML and CSS |
| | CO2 | Implement Dynamic Web Pages Using JavaScript |
| | CO3 | Build Web Applications Using Server-Side Scripting Languages (e.g., PHP, Node.js) |
| | CO4 | Integrate Databases with Web Applications Using SQL and NoSQL |
| | C05 | Deploy and Host Web Applications on a Web Server |
| C317<br>Industrial Training / Skill Development Programme | CO1 | Gain Practical Exposure to Industry Practices and Work Culture |
| | CO2 | Develop Technical Skills Relevant to Industry Requirements |
| | CO3 | Improve Problem-Solving and Analytical Skills in Real-World Contexts |
| | CO4 | Enhance Communication and Interpersonal Skills in a Professional Environment |
| | C05 | Understand and Apply Industry Standards, Safety Practices, and Ethical Responsibilities |
| C401<br>Cryptography and Network Security | CO1 | Compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication |
| | CO2 | Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes. |
| | CO3 | Apply different digital signature algorithms to achieve |

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| | | authentication and create secure applications |
| | CO4 | Apply network security basics, analyze different attacks on networks and evaluate the performance of firewalls and security protocols like SSL, IPSec, and PGP |
| | CO5 | Apply the knowledge of cryptographic utilities and authentication mechanisms to design secure applications |
| C402 UML & Design Patterns | CO1 | Illustrate software design with UML diagrams |
| | CO2 | Design software applications using OO concepts |
| | CO3 | Identify various scenarios based on software requirements |
| | CO4 | Apply UML based software design into pattern based design using design patterns |
| | CO5 | Illustrate the various testing methodologies for OO software |
| C403 Machine Learning | CO1 | Identify machine learning techniques suitable for a given problem |
| | CO2 | Solve the problems using various machine learning techniques |
| | CO3 | Apply Dimensionality reduction techniques |
| | CO4 | Design application using machine learning techniques |
| C404 Open Elective -II (Inter Disciplinary)- Embedded System | CO1 | Understand the Architecture and Operation of Embedded Systems |
| | CO2 | Design and Develop Embedded Software for Microcontrollers |
| | CO3 | Interface Embedded Systems with External Devices and Sensors |
| | CO4 | Implement Real-Time Operating Systems (RTOS) for Embedded Systems |
| | CO5 | Analyze and Optimize Embedded Systems for Power, Performance, and Cost Efficiency |
| C405 Professional Elective-III-Software Project Management | 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. |
| C406 Professional Elective-IV-Cloud Computing | 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 | Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications |
| | CO4 | Evaluate own organizations' needs for capacity building and training in cloud computing related IT areas |

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| | CO5 | Illustrate Virtualization for Data-Center Automation |
| C407<br>UML Lab | CO1 | Know the syntax of different UML diagrams |
| | CO2 | Create use case documents that capture requirements for a software system |
| | CO3 | Create class diagrams that model both the domain model and design model of a software system |
| | CO4 | Create interaction diagrams that model the dynamic aspects of a software system |
| | CO5 | Write code that builds a software system |
| | CO6 | Develop simple applications |
| C408<br>Project- I | CO1 | Identify and Define a Research Problem in the Chosen Area of Study |
| | CO2 | Conduct a Literature Review and Identify Existing Solutions |
| | CO3 | Develop a Conceptual Design or Approach for the Solution |
| | CO4 | Develop a Detailed Project Plan and Timeline for Implementation |
| | CO5 | Demonstrate Effective Communication and Documentation Skills |
| C409<br>IPR & Patents | CO1 | IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents |
| | CO2 | Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements |
| C410<br>Management and Organizational Behavior | CO1 | After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational structure |
| | CO2 | Will familiarize with the concepts of functional management that is HRM and Marketing of new product developments |
| | CO3 | The learner is able to think in strategically through contemporary management practices |
| | CO4 | The learner can develop positive attitude through personality development and can equip with motivational theories |
| | CO5 | The student can attain the group performance and grievance handling in managing the organizational culture |
| C411<br>Open Elective- III<br>(Inter Disciplinary)- | CO1 | Identify and Define a Research Problem in the Chosen Area of Study |
| | CO2 | Conduct a Literature Review and Identify Existing Solutions |

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| Internship | CO3 | Develop a Conceptual Design or Approach for the Solution |
| | CO4 | Develop a Detailed Project Plan and Timeline for Implementation |
| | CO5 | Demonstrate Effective Communication and Documentation Skills |
| C412<br>Professional Elective-V<br>Devops | CO1 | Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service agility |
| | CO2 | Describe DevOps & DevSecOps methodologies and their key concepts |
| | CO3 | Illustrate the types of version control systems, continuous integration tools, continuous monitoring tools, and cloud models |
| | CO4 | Set up complete private infrastructure using version control systems and CI/CD tools |
| C413<br>Project- II | CO1 | Implement and Develop the Solution Based on the Conceptual Design from Project-I |
| | CO2 | Integrate and Test the Components to Develop a Fully Functional System |
| | CO3 | Conduct System Validation and Performance Analysis |
| | CO4 | Optimize the System for Power, Performance, and Cost |
| | CO5 | Communicate the Results Effectively through Documentation and Presentation |

**Coordinator** **HOD** **Principal**