JYOTHISHMATHI INSTITUTE OF TECHNOLOGY & SCIENCE
Approved by AICTE, New Delhi and Affiliated to JNTU, Hyderabad
Accredited with NAAC "A" Grade
(An ISO 9001:2015 Certified Institution)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Course Outcomes (COs)

(SAR should include course outcomes of one course from each semester of study, however, should be prepared for all courses and made available as evidence)

The course outcomes are statements that describe the expected depth of understanding of the disciplinary subject and the essential abilities related to it upon completion of the course. The course outcomes for each course are outlined in the program syllabi. Course outcomes are formulated to meet the following guidelines:

- They follow Bloom's taxonomy.
- They reflect the entire syllabus prescribed by the Institute for each course.
- A key topic from each unit is designated as one course outcome.
- The number of course outcomes for each course should not exceed five.

I YEAR/I-SEMESTER

C101	MA101BS	Mathematics-I	3-1-0 (L-T-P)	4 Credits

Course outcomes: At the end of the course, the student will be able to:

C101.1	Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations
C101.2	Find the Eigen values and Eigen vectors and reduce the quadratic form to canonical form by orthogonal transformations.
C101.3	Analyze the nature of sequence and series.
C101.4	Solve the applications on the mean value theorems and evaluate the improper integrals using Beta and Gamma functions
C101.5	Find the extreme values of functions of two variables with/ without constraints.

C102	CH102BS	ENGINEERING CHEMISTRY	3-1-0 (L-T-P)	4 Credits

Course outcomes: At the end of the course, the student will be able to:

C102.1	The concept of molecular and atomic orbital's and band theory related to conductivity
C102.2	Application of different methods to convert hard water into soft water
C102.3	Apply the electrochemistry concept to control corrosion process
C102.4	Analysis of reaction mechanism of organic molecules and synthesis drug molecules
C102.5	Application of basic techniques of spectroscopy in medical and other field

C103	EE103ES	Basic Electrical Engineering	3-0-0 (L-T-P)	3 Credits

Course outcomes: At the end of the course, the student will be able to:

C103.1	Apply the concepts of KVL/KCL and network theorems in solving DC circuits.

C103.2	Understand and Analyze the AC fundamentals, AC circuits, phase relation and quality factor
C103.3	Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer.
C103.4	Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications.
C103.5	Describe the components of low voltage electrical installations and perform elementary calculations for energy consumption.

C104	ME105ES	Engineering Workshop	1-0-3 (L-T-P)	2.5 Credits

Course outcomes: At the end of the course, the student will be able to:

C104.1	Apply suitable tools for preparing different components of engineering processes, including material removal, measuring, chiseling fitting, and carpentry experiments.
C104.2	Students are able to build tin metal parts in real-world applications.
C104.3	Practice on tools in foundry, able to understand the properties of mould making
C104.4	Apply basic electrical engineering knowledge to house wiring practice
C104.5	Practice in fabrication of components using methods like welding and black smithy.

C105	EN105HS	English	2-0-0 (L-T-P)	2 Credits

Course outcomes: At the end of the course, the student will be able to:

C105.1	Better understanding of nuances of English language through audio –visual experience &group activities
C105.2	Classify the given texts and respond appropriately
C105.3	Illustrate confidently in various contexts and different cultures
C105.4	Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills
C105.5	Analyse the language emphasis on vocabulary and grammar

C106	CH106BS	Engineering Chemistry Lab	0-0-3 (L-T-P)	1.5 Credits

Course outcomes: At the end of the course, the student will be able to:

C106.1	Determination of parameters like hardness and chloride content in water
C106.2	Estimation of rate constant of reaction from concentration –time relationship
C106.3	Determination of physical properties like adsorption and viscosity
C106.4	Calculation of R_f values of some organic molecules by TLC technique
C106.5	Able to perform methods such as conductometry and potentiometry in order to find out concentration of acids and bases

C107	EN107HS	English Language and Communication Skills Lab	0-0-2 (L-T-P)	1 Credits

Course outcomes: At the end of the course, the student will be able to:

C107.1	Better understanding of nuances of English language through audio –visual experience &group activities
C107.2	Neutralization of accent for intelligibility
C107.3	Speaking skills with clarity & confidence which in turn enhances their employability skills
C107.4	Personality traits like decision making, problem solving & leadership qualities
C107.5	Development of conversation skills

C108	EE108ES	Basic Electrical Engineering Lab	0-0-2 (L-T-P)	1 Credits

Course outcomes:

C108.1	Illustrate the application of KVL/KCL and network theorems to DC electrical circuits.
C108.2	Analyze the power factor and measure power of single phase and three phase AC electrical circuits.
C108.3	Demonstrate the behavior of a single-phase AC series resonant circuit.
C108.4	Calculate efficiency of a single-phase transformer and DC machine.
C108.5	Demonstrate speed measurement and speed reversal of three phase induction motor and identify the type of DC and AC machines based on their construction.

I YEAR/II-SEMESTER

C109	MA201BS	Mathematics – II	3-1-0 (L-T-P)	4 Credits

Course outcomes: At the end of the course, the student will be able to:

C109.1	Identify whether the given differential equation of first order is exact or not.
C109.2	Apply the concept of higher differential equation to real World problems.
C109.3	Evaluate the multiple integrals and apply the concept to find areas volumes.
C109.4	Understand the importance of vector operators and their physical significance
C109.5	Evaluate the line, surface and volume integrals and converting them from one to another.

C110	AP202BS	Applied Physics	3-1-0 (L-T-P)	4 Credits

Course outcomes: At the end of the course, the student will be able to:

C110.1	Understand the fundamental concepts on Quantum behavior of matter in its micro state.
C110.2	Apply fundamentals of Semiconductor physics, Optoelectronics, Lasers and fibre optics concepts to various systems like communications, solar cell, photo cells.
C110.3	Design, characterization and study of properties of materials.
C110.4	Understand the phenomena of electromagnetism, magnetic materials and dielectric materials.
C110.5	Understand various aspects of nano materials.

C111	CS203ES	Programming for Problem Solving	3-1-0 (L-T-P)	4 Credits

Course outcomes: The student will learn

C111.1	Understand the basic s of computers, algorithms and flowcharts for computer problems
C111.2	Apply different types of control structures in computer programming
C111.3	Develop programs that make use of concepts such as arrays, pointers, strings, structures and files

C111.4	Develop programs using modular approach
C111.5	Solve searching and sorting problems

C112	ME204ES	Engineering Graphics	1-0-4 (L-T-P)	3 Credits

Course outcomes: At the end of the course, the student will be able to:

C112.1	Understand basic engineering drawing standards and curves.
C112.2	Understand the system of projection with respect to the reference planes of various objects.
C112.3	Construct the internal details of cut section models.
C112.4	Build the development of solid surfaces.
C112.5	Design the 3D isometric view from the 2D orthographic views and vice versa.

C113	AP205BS	Applied Physics Lab	0-0-3 (L-T-P)	1.5 Credits

Course outcomes: At the end of the course, the student will be able to:

C113.1	Learn the fundamental concepts on electronic devices like L.C.R, R.C, L.E.D etc
C113.2	Fundamentals of electric nature enable the students to applying varies areas like Hall effect, photo electric effect.
C113.3	Exposed to the phenomenon of electromagnetism, photo voltaic effect in daily life.
C113.4	Identify the type of semiconductor by finding energy gap value.
C113.5	Gain the knowledge about the bending losses of optical fiber.

C114	CS206ES	Programming for Problem Solving Lab	0-0-3 (L-T-P)	1.5 Credits

Course outcomes: The candidate is expected to be able to:

C114.1	Write the algorithms and draw flowcharts for solving Mathematical and Engineering problems.
C114.2	Apply data types and operators in data processing applications.
C114.3	Design and develop Computer programs using decision making statements, iteration, function and recursion.
C114.4	Demonstrate an understanding of computer programming language concepts using array and structures.
C114.5	Implement Computer programs, analyzes, and interprets the concept of pointers and file handling and their usage.

C115	*MC209ES	Environmental Science	3-0-0 (L-T-P)	0 Credits

Course outcomes: At the end of the course, the student will be able to:

C115.1	Gain knowledge about environment and ecosystem.
C115.2	Students will learn about natural resource, its importance and environmental impacts of Human activities on natural resource.
C115.3	Gain knowledge about the conservation of biodiversity and its importance.
C115.4	Aware students about problems of environmental pollution, its impact on human and Ecosystem and control measures.
C115.5	Students will learn about increase in population growth and importance of the acts.

II YEAR/I-SEMESTER

C201	CS301ES	Analog and Digital Electronics	3-0-0 (L-T-P)	3 Credits

Course outcomes: At the end of the course, the student will be able to:

C201.1	Understand the utilization of components
C201.2	Design and analyze small signal amplifier circuits
C201.3	Learn Postulates of Boolean algebra and to minimize combinational functions
C201.4	Design and analyze combinational and sequential circuits
C201.5	Know about the logic families and realization of logic gates.

C202	CS302PC	Data Structures	3-1-0 (L-T-P)	4 Credits

Course outcomes: At the end of the course, the student will be able to:

C202.1	Understand the basic concepts of linear and non-linear data structures
C202.2	Describe the dictionaries, hash table representations and collision resolution methods
C202.3	Design programs using a variety of data structures including binary and general tree structures, search trees
C202.4	Apply algorithms for solving problems of graphs and sorting techniques
C202.5	Implement the algorithms of pattern matching and tries

C203	MA303BS	Computer Oriented Statistical Methods	3-1-0 (L-T-P)	4 Credits

Course outcomes: At the end of the course, the student will be able to:

C203.1	Apply the concept of Probability and distribution to some case studies
C203.2	Analyze and interpret Statistical data using appropriate probability distributions.
C203.3	Understand different type of sampling distribution and apply in various fields in real world problems
C203.4	Apply test of hypothesis to accept or reject a given hypothesis.
C203.5	Apply stochastic process and Markov process to solve various problems.

C204	CS304PC	Computer Organization and Architecture	3-0-0 (L-T-P)	3 Credits

Course outcomes: At the end of the course, the student will be able to:

C204.1	Understand the basics of instructions sets and their impact on processor design.
C204.2	Demonstrate an understanding of the design of the functional units of a digital computer system.
C204.3	Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.
C204.4	Design a pipeline for consistent execution of instructions with minimum hazards.
C204.5	Recognize and manipulate representations of numbers stored in digital computers

C205	CS305PC	Object Oriented Programming using C++	2-0-0 (L-T-P)	2 Credits

Course outcomes: At the end of the course, the student will be able to:

C205.1	Understand the basic of Object Oriented Programming Concepts.
C205.2	Develop programs using classes and Data abstraction.
C205.3	Develop C++ programs with reusability concept.
C205.4	Develop programs for File Handling.
C205.5	Handle Exceptions in C++ Programming.

C206	CS306ES	Analog and Digital Electronics Lab	0-0-2 (L-T-P)	1 Credits

Course outcomes: At the end of the course, the student will be able to:

C206.1	Understand the utilization of components
C206.2	Design and analyze small signal amplifier circuits
C206.3	Learn Postulates of Boolean algebra and to minimize combinational functions
C206.4	Design and analyze combinational and sequential circuits
C206.5	Know about the logic families and realization of logic gates.

C207	CS307PC	Data Structures Lab	0-0-3 (L-T-P)	1.5 Credits

Course outcomes: At the end of the course, the student will be able to:

C207.1	Implement various types of linked lists and their applications
C207.2	Implement the stack, Queue and their applications
C207.3	Implement searching and sorting algorithms
C207.4	Implement tree traversal operations
C207.5	Implement Graph traversal techniques

C208	CS308PC	IT Workshop Lab	0-0-3 (L-T-P)	1.5 Credits

Course outcomes: At the end of the course, the student will be able to:

C208.1	Understand basic peripherals of a personal computer.
C208.2	Assemble and disassemble a personal computer and install system softwares such as windows and linux.
C208.3	Understand & Demonstrate the procedure to access websites and emails.
C208.4	Create word documents; excel spread sheets, power point presentations using Latex Tools.
C208.5	Develop Excel/Spread sheets to calculate GPA and performance analysis

C209	CS309PC	C++ Programming Lab	0-0-2 (L-T-P)	1 Credits

Course outcomes: At the end of the course, the student will be able to:

C209.1	Understand the basics of object-oriented programming using C++ .
C209.2	Apply the concept of classes, abstraction and develop Simple C++ Programs.
C209.3	Design Simple C++ Programs using inheritance and polymorphism concepts.
C209.4	Implement file & Exception handling concepts using c++.
C209.5	Develop applications for a range of problems using object-oriented programming techniques

C210	MC309	Gender Sensitization Lab	0-0-2 (L-T-P)	0 Credits

Course outcomes: At the end of the course, the student will be able to:

C210.1	Developed a better understanding of important issues related to gender in contemporary India.
C210.2	Basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
C210.3	How gender discrimination works in our society and how to counter it.
C210.4	Acquire insight into the gendered division of labour and its relation to politics and economics.
C210.5	Develop a sense of appreciation of women in all walks of life.

II YEAR/II-SEMESTER

C211	CS401PC	Discrete Mathematics	3-0-0 (L-T-P)	3 Credits

Course outcomes: At the end of the course, the student will be able to:

C211.1	Apply mathematical logic in discrete problems.
C211.2	Understand sets, relations, functions, and discrete structures.
C211.3	Analyze the efficiency of a developed algorithm of a computational problem.
C211.4	Understand discrete probability and counting techniques
C211.5	Apply graph theory in computing problem

C212	SM402MS	Business Economics & Financial Analysis	3-0-0 (L-T-P)	3 Credits

Course outcomes: At the end of the course, the student will be able to:

C212.1	Understand the various forms of business and the impact of economic variables on the Business.
C212.2	Apply the concepts of Demand and Supply under given market conditions.
C212.3	Apply the concepts of production function, Cost, Market Structure, Pricing and BEP analysis for managerial decision making.
C212.4	Ascertain financial performance and financial position of an organization.
C212.5	Analyze and interpret the financial statement through Ratio analysis and Funds flow statement & Cash flow statement.

C213	CS403PC	Operating Systems	3-0-0 (L-T-P)	3 Credits

Course outcomes: At the end of the course, the student will be able to:

C213.1	Analyze the OS structure and basic architectural components involved in its design
C213.2	Analyze and design the applications for CPU scheduling and process management.

C213.3	Understand the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system
C213.4	Analyze the memory management and virtual memory management techniques.
C213.5	Interpret the mechanisms adopted for file sharing in distributed Applications

C214	CS404PC	Database Management Systems	3-1-0 (L-T-P)	4 Credits

Course outcomes: At the end of the course, the student will be able to:

C214.1	Understand the basic concepts of Database.
C214.2	Analyze real world problems in the context of DBMS and demonstrate them using ER diagrams.
C214.3	Construct sql quiries and apply normalization techniques in developing database application.
C214.4	Understand the basics of transaction processing and concurrency control.
C214.5	Compare database storage structures and access techniques.

C215	CS405PC	Java Programming	3-1-0 (L-T-P)	4 Credits

Course outcomes: At the end of the course, the student will be able to:

C215.1	Understand real world problems using OOP techniques.
C215.2	Implementation of Packages and Interface in java.
C215.3	Develop multithreaded applications with synchronization and exception handling
C215.4	Solve problems using Collection Framework and IO classes.
C215.5	Develop GUI application using applet classes, swing components and event handling programs.

C216	CS406PC	Operating Systems Lab	0-0-3(L-T-P)	1.5 Credits

Course outcomes: At the end of the course, the student will be able to:

C216.1	Simulate CPU Scheduling algorithms
C216.2	Implement deadlock detection and avoidance algorithms
C216.3	Understand and execute memory management concepts such as paging , segmentation and page replacement algorithms
C216.4	Implement file management concepts
C216.5	Implement C programs using Unix system calls.

C217	CS407PC	Database Management Systems Lab	0-0-3 (L-T-P)	1.5 Credits

Course outcomes: At the end of the course, the student will be able to:

C217.1	Analyze real world problems in the context of DBMS and demonstrate them using ER diagrams.
C217.2	Design database schema for a given applications.
C217.3	Apply normalization techniques in developing database application.
C217.4	Construct SQL commands.

C217.5	Develop solutions for database applications using procedures, cursors and triggers.

C218	CS408PC	Java Programming Lab	0-0-2 (L-T-P)	1 Credits

Course outcomes: At the end of the course, the student will be able to:

C218.1	develop programs for solving real world problems using collection framework
C218.2	Develop programs using abstract classes
C218.3	Implement exception handling and multithreaded applications using java.
C218.4	Analyze and Design GUI based applications using swings and applets
C218.5	Develop applets for web applications.

C219	MC409	Constitution of India	3-0-0 (L-T-P)	0 Credits

Course outcomes:

C219.1	Understand features and perspectives of the Indian constitution
C219.2	Demonstrate fundamental rights, duties and directive principles
C219.3	Describe federal structure, parliament system, powers of president and amendment of constitutional procedures
C219.4	Interpret emergency provisions and local self government
C219.5	Apply right to equality, right to life and personal liberty

III YEAR/I-SEMESTER

C301	CS501PC	Formal Languages & Automata Theory	3-0-0 (L-T-P)	3 Credits

Course outcomes: At the end of the course, the student will be able to:

C301.1	Understand the concept of abstract machines and their power to recognize the languages.
C301.2	Conversion of regular expression to finite automata and finite automata to regular expression
C301.3	Design push down automata and context free grammars for context free languages.
C301.4	Utilize tm to model computations and demonstrate the understanding of their varients.
C301.5	Evaluate decidable to undecidability problems

C302	CS502PC	Software Engineering	3-0-0 (L-T-P)	3 Credits

Course outcomes: At the end of the course, the student will be able to:

C302.1	Understand the SDLC models and apply them into real world applications.
C302.2	Apply the principles of requirements engineering and utilize various system modeling techniques.
C302.3	Apply software design principles and methodologies to create high quality software architectures.
C302.4	Implement various software testing strategies to ensure software quality.
C302.5	Apply software measurement techniques to evaluate software quality and implement risk management strategies.

C303	CS503PC	Computer Networks	3-0-0 (L-T-P)	3 Credits

Course outcomes: At the end of the course, the student will be able to:

C303.1	Understand concept of networking and architecture including OSI and TCP/IP models
C303.2	Analyze and apply different protocols for score detection data link control and medium access control
C303.3	Evaluate and design routing algorithms network layer protocols IP addressing
C303.4	Understand the transport layer protocols and their flow and error control mechanisms
C303.5	Analyze application layer protocols like HTTP,FTP,DNS and email and their functioning

C304	CS504PC	Web Technologies	3-0-0 (L-T-P)	3 Credits

Course outcomes: At the end of the course, the student will be able to:

C304.1	Develop dynamic web applications using php
C304.2	Develop web pages using css and html and manage structured data with xml
C304.3	Implement servlet API to create dynamic web content
C304.4	Design dynamic web pages using java serve pages
C304.5	Develop interactive and dynamic web applications using java script.

C305	CS513PE	Data Analytics (PE-I)	3-0-0 (L-T-P)	3 Credits

Course outcomes: At the end of the course, the student will be able to:

C305.1	Apply the principle of data architecture to design efficient data systems to integrate data sources
C305.2	Apply data analytic tools and modeling techniques in business applications
C305.3	Build estimation model using regression concepts and techniques
C305.4	Analys supervised and unsupervised model to estimate accuracy of the algorithms
C305.5	Apply data visualizations techniques to visualize and interpet complex data

C306	CS522PE	Advanced Operating Systems (PE-II)	3-0-0 (L-T-P)	3 Credits

Course outcomes: At the end of the course, the student will be able to:

C306.1	Understand the design approaches of advanced operating systems
C306.2	Analyze the design issues of distributed operating systems.
C306.3	Evaluate the design considerations of mult processor operating systems.
C306.4	Identify the requirements for Distributed File System and Distributed Shared Memory.
C306.5	Develop the solutions for scheduling the real time applications.

C307	CS505PC	Software Engineering Lab	0-0-3 (L-T-P)	1.5 Credits

Course outcomes: At the end of the course, the student will be able to:

C307.1	Develop a clear and comprehensive problem statement for a software project, defining the scope, objectives, and constraints.
C307.2	Prepare detailed Software Requirement Specification (SRS) documents, design documents, and testing phase-related documents to support the software development lifecycle.
C307.3	Create Software Configuration Management (SCM) and Risk Management documents to ensure effective project management and mitigation of potential risks.

C307.4	Utilize a Design phase CASE (Computer-Aided Software Engineering) tool to assist in the design phase of software development.
C307.5	Design and implement software solutions using Design phase CASE tools, and develop test cases for unit testing, integration testing, and various white box and black box testing techniques.

C308	CS506PC	Computer Networks & Web Technologies Lab	0-0-3 (L-T-P)	1.5 Credits

Course outcomes: At the end of the course, the student will be able to:

C308.1	Implement and test data link layer techniques, including framing methods, CRC code computation, flow control, and loss recovery mechanisms.
C308.2	Develop and analyze network algorithms and tools, such as shortest path algorithms, routing algorithms, data encryption/decryption, and network simulation using tools like Wireshark, Nmap, and NS2 Simulator.
C308.3	Create PHP scripts for basic programming tasks, including printing prime numbers, string manipulation, array merging, and file operations.
C308.4	Design and develop static web pages for an online bookstore, and validate forms using JavaScript.
C308.5	Implement dynamic web pages using Java Servlets and JSP, with database integration and MVC architecture.

C309	EN508HS	Advanced Communication Skills Lab	0-0-2 (L-T-P)	1 Credits

Course outcomes: At the end of the course, the student will be able to:

C309.1	Improve the student's fluency in English, with a focus on vocabulary
C309.2	Enable them to listen to English spoken at normal conversational speed by educated English speakers
C309.3	Respond appropriately in different socio-cultural and professional contexts
C309.4	Communicate their ideas relevantly and coherently in writing
C309.5	Preparing the students for placements

C310	*MC510	Intellectual Property Rights	3-0-0 (L-T-P)	0 Credits

Course outcomes: At the end of the course, the student will be able to:

C310.1	The students are able to understand Fundamentals of Intellectual property areas and its latest developments at National and International level
C310.2	The students are able to understand Trademarks acquisition and its remedies for violation
C310.3	The students are able to determine the Fundamentals of Copyrights Law, Copyrights ownership and remedies available for its violation.
C310.4	The students are able to apply their knowledge for Patent concept ,its filing and Registration
C310.5	The students are able to explain Trade secrets Law and its protection

III YEAR/II-SEMESTER

C311	CS601PC	Machine Learning	3-1-0 (L-T-P)	4 Credits

Course outcomes: At the end of the course, the student will be able to:

C311.1	Apply concept learning and decision tree learning techniques to design and evaluate machine learning models
C311.2	Implement and assess artificial neural networks, including basic algorithms and advanced topics, and evaluate learning hypotheses
C311.3	Utilize Bayesian learning methods and instance-based learning techniques to develop and analyze machine learning models
C311.4	Apply genetic algorithms, rule-based learning, and reinforcement learning techniques to solve complex learning tasks
C311.5	Integrate inductive and analytical learning methods, including the use of prior knowledge for improving learning algorithms and search objectives.

C312	CS602PC	Compiler Design	3-1-0 (L-T-P)	4 Credits

Course outcomes: At the end of the course, the student will be able to:

C312.1	Create and use lexical analyzers to process and recognize tokens in programming languages.
C312.2	Implement syntax analysis methods to parse and analyze code structures using different parsing techniques.
C312.3	Generate and use intermediate code from syntax trees to support further stages of compilation.
C312.4	Manage run-time environments and generate efficient code with optimization techniques.
C312.5	Apply optimization techniques to improve the performance of compiled code through various data-flow analyses

C313	CS603PC	Design and Analysis of Algorithms	3-1-0 (L-T-P)	4 Credits

Course outcomes: Upon completing this course, the student will be able to

C313.1	Use and analyze divide and conquer methods, and understand performance measurement techniques.
C313.2	Apply disjoint set operations and backtracking techniques to solve constraint satisfaction problems.
C313.3	Solve complex optimization problems using dynamic programming techniques.
C313.4	Solve optimization problems using the greedy method
C313.5	Implement branch and bound techniques and understand NP-Hard and NP-Complete problems.

C314	CS615PE	Software Testing Methodologies (PE-III)	3-0-0 (L-T-P)	3 Credits

Course outcomes: At the end of the course, the student will be able to:

C314.1	Learn the basics of software testing and apply path testing techniques using flow graphs.
C314.2	Use transaction flow, dataflow, and domain testing techniques to assess software quality.
C314.3	Apply path products, path expressions, and regular expressions for testing and detecting issues.
C314.4	Create and use state graphs for testing software behavior and state transitions.
C314.5	Apply graph matrix techniques and testing tools like JMeter or WinRunner for software testing.

C315	EC600OE	Internet of Things (OE-I)	3-0-0 (L-T-P)	3 Credits

Course outcomes: At the end of the course, the student will be able to:

C315.1	Understand fundamentals of the Internet of Things
C315.2	Develop applications by using IOT techniques.
C315.3	Developing python applications to support IOT devices
C315.4	Analyze the data using Arduino & Raspberry Pi.
C315.5	Analyse the revolution of Internet in Mobile Devices, Cloud & Sensor Networks

C316	CS604PC	Machine Learning Lab	0-0-3 (L-T-P)	1.5 Credits

Course outcomes: At the end of the course, the student will be able to:

C316.1	Understand fundamentals of the Machine learning
C316.2	Understand complexity of Machine Learning algorithms and their limitations
C316.3	Examine the real-world dataset & connect database to Python
C316.4	Implement Machine Learning classification Techniques
C316.5	Develop prediction model for given data using machine learning technique

C317	CS605PC	Compiler Design Lab	0-0-3 (L-T-P)	1.5 Credits

Course outcomes: At the end of the course, the student will be able to:

C317.1	Design lexical analyzer to scan reserve words and identifiers
C317.2	Implement predictive parsing algorithm for syntax analysis
C317.3	Develop an application to produce three address code for a given c program
C317.4	Design and implement SLR parsing algorithm
C317.5	Design and implement LALR bottom-up parser for the given language

C318	CS625PE	Software Testing Methodologies Lab (PE-III Lab)	0-0-2 (L-T-P)	1 Credits

Course outcomes: At the end of the course, the student will be able to:

C318.1	Apply automation techniques using context sensitive and analog modes
C318.2	Perform GUI bit map check points to ensure visual and functional accuracy
C318.3	Implement database checkpoints to validate data integrity
C318.4	Execute data driven test with dynamic inputs and various data sources
C318.5	Perform and stream line batch testing including silent mode excution

C319	*MC609	Environmental Science	3-0-0 (L-T-P)	0 Credits

, **Course outcomes**: At the end of the course, the student will be able to:

C319.1	Gain knowledge about environment and ecosystem.
C319.2	Students will learn about natural resource, its importance and environmental impacts of Human activities on natural resource.
C319.3	Gain knowledge about the conservation of biodiversity and its importance.
C319.4	Aware students about problems of environmental pollution, its impact on human and Ecosystem and control measures.
C319.5	Students will learn about increase in population growth and importance of the acts.

IV YEAR/I-SEMESTER

C401	CS701PC	Cryptography & Network Security	3-0-0 (L-T-P)	3 Credits

Course outcomes: Upon completing this course, the student will be able to

C401.1	Understand the basic security concepts, including the types of attacks, cryptography techniques, and models for network security.
C401.2	Explore symmetric and asymmetric key ciphers, including widely used algorithms like DES, AES, and RSA.
C401.3	Learn about cryptographic hash functions, message authentication codes, digital signatures, and key management techniques.
C401.4	Implement security at the transport level, including web security, SSL/TLS, and wireless network security.
C401.5	Analyze case studies on cryptography and security applications

C402	CS702PC	Data Mining	2-0-0 (L-T-P)	2 Credits

Course outcomes: At the end of this course, students will demonstrate the ability to

C402.1	Understand the types of the data to be mined and present a general classification of tasks and primitives to integrate a data mining system
C402.2	Apply association rule mining techniques to discover frequent patterns and correlations in data.
C402.3	Develop classification models using decision tree induction, Bayesian classification, rule-based classification, and lazy learners.
C402.4	Perform cluster analysis and understand the different clustering methods and their applications.
C402.5	Explore advanced methods to mine complex data types like time-series, spatial, multimedia, and web data.

C403	CS714PE	Cloud Computing (PE-IV)	3-0-0 (L-T-P)	3 Credits

Course outcomes: At the end of the course, the student will be able to:

C403.1	Explore various computing paradigms like cloud, parallel, distributed, and quantum computing.

C403.2	Understand the basics of cloud computing, including its definition, characteristics, and deployment models.
C403.3	Learn about cloud architecture, management, and migration strategies.
C403.4	Compare different cloud service models (IaaS, PaaS, SaaS) and understand their characteristics, benefits, and providers.
C403.5	Analyse major cloud providers like Google, Amazon, Microsoft, and IBM, and their services.

C404	CS725PE	Software Process & Project Management (PE-V)	3-0-0 (L-T-P)	3 Credits

Course outcomes: At the end of the course, the student will be able to:

C404.1	Learn about different levels of software process maturity and models like Capability Maturity Model (CMM), CMMI, PCMM, PSP, and TSP.
C404.2	Study the Evolution of Software Management to understand the different phases of the software life cycle and Learn about the different types of artifacts involved in these phases.
C404.3	Understand workflows in software processes, including milestones, status assessments, and planning techniques like work breakdown structures and cost estimation.
C404.4	Learn about different project organizations, project control techniques, core metrics, and automation in project management.
C404.5	Study modern software project profiles, next-generation software economics, and future trends in process transitions.

C405	CE700OE	Remote Sensing & GIS (OE-II)	3-0-0 (L-T-P)	3 Credits

Course outcomes: At the end of the course, the student will be able to:

C405.1	Understand different concepts and terms used in Remote Sensing and its data
C405.2	Understand data conversion and Process in different coordinate systems of GIS
C405.3	Understand the system of database management and data structures
C405.4	Evaluating the process of accuracy data, errors and interpolation techniques
C405.5	Understand the applicability of RS&GIS and implementation for various applications.

C406	CS703PC	Cryptography & Network Security Lab	0-0-2 (L-T-P)	1 Credits

Course outcomes: At the end of the course, the student will be able to:

C406.1	Apply fundamental bitwise operations to manipulate strings and understand the complexity they introduce in encryption.
C406.2	Implement and analyze classical and modern encryption algorithms to secure data.
C406.3	Utilize cryptography for real-world encryption tasks, emphasizing the practical application of cryptographic principles.
C406.4	Implement public-key cryptography algorithms and key exchange mechanisms.
C406.5	Calculate and analyse message digests using cryptographic hash functions to check data integrity and authentication.

C407	CS704PC	Industrial Oriented Mini Project	0-0-0 (L-T-P)	2* Credits

Course outcomes: At the end of the course, the student will be able to:

C407.1	Identify and define a real-world industrial problem, creating a project plan with clear objectives and timelines.
C407.2	Apply course knowledge and technical skills to design and implement a solution.
C407.3	Use relevant tools and technologies to develop a working prototype or proof-of-concept.
C407.4	Collaborate within a team to manage tasks and deliver the project on time.
C407.5	Present the project results with clear documentation and demonstrations, showcasing its industry relevance.

C408	CS705PC	Seminar	0-0-2 (L-T-P)	1 Credits

Course outcomes: At the end of the course, the student will be able to:

C408.1	Conduct research and understand current technical topics in the computer field.
C408.2	Create and organize seminar content in a PPT.
C408.3	Present technical content effectively and confidently to an audience.
C408.4	Integrate information from various sources to support the seminar topic.
C408.5	Collaborate with peers to give and receive feedback on presentations.

C409	CS706PC	Project Stage - I	0-0-6 (L-T-P)	3 Credits

Course outcomes: At the end of the course, the student will be able to:

C409.1	Identify and formulate research problem from acquired knowledge
C409.2	Analyze and categorise problem modules with potential risk
C409.3	Design and develop solution to the contemporary problem
C409.4	Choose the effective Plan and Methodology for setting the project
C409.5	Utilization of efficient Development tools to implement and execute the project

IV YEAR/II-SEMESTER

C410	SM801MS	Organizational Behaviour	3-0-0 (L-T-P)	3 Credits

Course outcomes: After completion of this course, the student will be able to:

C410.1	Recall the fundamentals of Organizational Behavior and the need of impression management.
C410.2	Differentiate the individual differences like personality, motivation, emotional intelligence and self-efficacy.
C410.3	Develop the communication, decision making skills to overcome institutional and individual obstacles.
C410.4	Categorize the group dynamics, power factors affecting group and team performance.
C410.5	Implement Behavioral modification, Leadership and the importance of learning and work life balance.

C411	CS815PE	Cyber Forensics (PE-VI)	3-0-0 (L-T-P)	3 Credits

Course outcomes: After completion of this course, the student able to

C411.1	Understand the basics of digital forensics and incidence response
C411.2	Perform forensics duplication and collect data from windows and unix system
C411.3	Conduct forensic analysis, validate data & address data hiding fetching us.
C411.4	Use forensics tools to investigate emails , computers &mobile devices
C411.5	Analysis file system disc structores & start up tasks in windows & DOS systems

C412	CE800OE	Environmental Impact Assessment (OE-III)	3-0-0 (L-T-P)	3 Credits

Course outcomes: At the end of the course, the student will be able to:

C412.1	Formulate Need, Objectives and Stages of the EIA studies
C412.2	Identify the Environmental Attributes and choose the right Methodology among available Attributes
C412.3	Prepare EIA Reports and Environmental Management Plans
C412.4	Understand Environmental Legislation and Life Cycle Assessment Analysis
C412.5	Evaluate and Describe Environmental Audits and Case Studies

C413	CS802PC	Project Stage - II	0-0-14 (L-T-P)	7 Credits

Course outcomes: At the end of the course, the student will be able to:

C413.1	Understand the methodologies for setting project objectives.
C413.2	Apply phases of the project
C413.3	Understand team members' task performance
C413.4	Apply the proposed methodologies for given project
C413.5	Evaluate Project timeline efficiency

Mandatory (Non-Credit) Course

B.Tech. III Year I/II Semester	CYBER SECURITY	3-0-0-0 (L-T-P-C)	0 Credits

Course outcomes: At the end of the course, the student will be able to:

C1	Understand the basic concepts and terminologies of cyber security, including vulnerabilities, threats, and attacks.
C2	Understand the process and techniques involved in cyber forensics and digital evidence management.
C3	Evaluate security measures and policies for mobile devices and identify potential vulnerabilities.
C4	Understand the impact of cybercrimes on organizations and the associated financial, legal, and privacy implications.
C5	Understand fundamental data privacy concepts and identify different types of data privacy attacks.

B.Tech. III Year I/II Semester	FUNDAMENTALS OF AI	3-0-0-0 (L-T-P-C)	0 Credits

Course outcomes: At the end of the course, the student will be able to:

C1	Understand basic AI concepts, agents, and environments, and apply different search strategies (uninformed, heuristic) to solve AI problems.
C2	Implement advanced search algorithms like A*, Minimax, and Alpha-Beta pruning, and apply logic-based reasoning techniques (propositional and first-order logic).
C3	Apply probabilistic reasoning and knowledge representation techniques to manage uncertainty in AI systems.
C4	Understand different types of learning and apply machine learning techniques, such as decision trees, to solve AI problems.
C5	Design expert systems using domain-specific knowledge and reasoning techniques to solve complex problems.