lendi Institute of Engineering & Technology
An Autonomous Institution
Accredited by NAAC with '' A'' Grade, Accredited by NBA (ECE, CSE,EEE & MECH)
Approved by A.I.C.T.E. & Permanently Affiliated to J. N. T. U. Gurajada, VIZIANAGARAM
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DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSEOUTCOMES(COs)

R23 REGULATION		
I Year – I Semester		
COURSE CODE	**COURSE NAME**	**COURSE OUTCOMES**
R23BSH-MA1101	Linear Algebra & Calculus	Apply the methods for solving linear equations to engineering applications.
		Apply the concepts of eigen values & eigen vectors to free vibration of two mass system.
		Apply mean value theorems to real world problems.
		Apply functions of several variables to compute maxima & minima.
		Apply multiple integrals to find volume & surface area of solids.

R23BSH-PH1101	Engineering Physics	Analyze the intensity of light variation due to polarization, interference & diffraction.
		Identify the crystals structures with X-Ray diffraction principles.
		Classify the various types of magnetic & dielectrics materials.
		Understand the basic concepts of quantum mechanics & the band theory of solids.
		Identify semiconductor types using Hall Effect.
R23BSH-EN1101	Communicative English	Understand the context, topic & specific information from social or transactional dialogues.
		Apply grammatical structures to formulate sentences & appropriate words &correct word forms.
		Improve competitive competence in formal & informal contexts for social & academics purposes.
		Summarize comprehend & appreciate reading, listening texts based on global comprehension.
		Write coherent paragraphs, essay, letters, emails & resumes.
R23MEC-ES1101	Basic Civil & Mechanical Engineering	Understand the disciplines of civil engineering & their role in development of society.
		Apply the concepts of surveying for measurement of distances, angles & levels.
		Understand the key elements of transportation engineering, water resources & environment engineering.
R23CIT-ES1101	Introduction to Programming	Understand basics of computers, the concept of algorithm & problem solving analysis.
		Understand the concepts of control structures, branching & looping statements.
		Apply the concepts of arrays in solving complex problems.
		Develop programs on modular programming using functions & strings.
		Develop an ability to debug & optimize the code & solve real time problem statements.

R23BSH-EN1102	Communicative English Lab	Understand the different aspects of English language oral communication with emphasis on listening & speaking skills.
		Apply communication skills through language learning activities.
		Analyze the English speech sounds, stress, rhythm & intonation for better listening & speaking comprehension.
		Evaluate & exhibit professionalism in participating debates & group discussions with polite turn-taking strategies & sound more professional while communicating with others.
		Create effective resonate & prepare them to face interviews & communicate appropriately in corporate settings.
R23BSH-PH1102	Engineering Physics Lab	Apply the working principles of laboratory experiments in optics, electrical & electronics.
		Compute the required parameter by suitable formula using experimental values in optics, electrical & electronics experiments.
		Analyze the experimental results through graphical interpretation.
		Identify the required precautions to carry out the experiment & handling the apparatus in the laboratory.
		Apply the working principle, procedures in lab experiments.
R23MEC-ES1102	Engineering Workshop	Identify Workshop tools and their operational capabilities.
		Practice on manufacturing of components using workshop trades including fitting, carpentry, foundary and welding.
		Apply fitting operations in various applications.
		Apply basic Electrical engineering knowledge for House wiring practice.
		Prepare the pipe joint with couplings for same diameter and with reduced diameters for the given application.

R23CIT-ES1102	IT Workshop	To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables.
		To demonstrate configuring the system as Dual boot both Windows and other Operating Systems
		To teach basic command line interface commands on Linux
		To teach the usage of Internet for productivity and self-paced life-long learning
		To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.
R23CIT-ES1103	Computer Programming Lab	Implement and execute the programs written in C language on Windows and Linux OS
		Apply conditional and iterative statements to solve real time scenarios in C
		Develop C programs which utilize memory efficiently through arrays and strings.
		Develop programs to demonstrate the applications through user defined datatypes.
		Construct programs using structures, unions, and files
R23BSH-MC1101	Health and Wellness, Yoga and Sports	Understand the importance of yoga and sports for Physical fitness and sound health.
		Demonstrate an understanding of health-related fitness components
		Compare and contrast various activities that help enhance their health.
		Assess current personal fitness levels.
		Develop Positive Personality
I Year–II Semester		
R23BSH-MA1201	Differential Equations and Vector calculus	Solve the first order ordinary differential equations related to various engineering fields.
		Solve the higher order differential equation and analyze physical situations.
		Solve partial differential equations of first order and higher order related to engineering applications
		Apply vector differential operators to the real world situations
		Estimate the work done against a field, circulation and flux using vector calculus.
R23BSH-CH1201	Chemistry	Categorize thermoplastics, thermosettings, elastomers conducting polymers and biodegradable polymers.
		Determine the conductance and emf values of various solutions using conductivity meter and potentiometer Compare the materials of construction for battery and electrochemical sensors.

		Apply the principle of nanomaterials, semiconductors, superconductors, and super capacitors in preparing modern engineering materials
		Demonstrate the construction and working hydro, geothermal, tidal and ocean thermal power plants.
		Understand the construction and working of UV-Visible Spectro photo meter, IR spectroscopy and HPLC chromatography techniques.
R23MEC-ES1201	Engineering Graphics	Understand the basics of Engineering Graphics to construct the polygon, curves and scales.
		Draw the orthographic projections of points and straight lines inclined to both the planes.
		Draw the projections of planes in various conditions.
		Draw the projections of regular solids, with its axis inclined to one plane and sections of solids
		Visualize the 3D isometric views from 2D orthographic views and vice versa along with basic introduction to CAD.
R23EEE-ES1201	Basic Electrical & Electronic Engineering	Understand the problem solving concepts associated to dc and ac circuits sand
		Understand the principle and operation of basic electrical machines and Measuring instruments
		Identify the electricity bill calculations and layout representation of electrical power systems
		Understand the operation of various basic semiconductor devices.
		Make use of the applications of semiconductor devices. Analyze the different digital circuits.
R23CTT-PC1201	Data Structures	Understand algorithmic complexities of linear data structures
		Design, implement, and apply linked lists for dynamic data storage via dynamic memory allocation.
		Apply stacks and queue model for real-world scenarios
		Understand the basic tree data structures and tree traversals
		Recognize scenarios where hashing is advantageous, and design hash-based solutions
R23BSH-CH1202	Chemistry Lab	Determine the cell constant and conductance of different solutions.
		Prepare advanced polymer Bakelite materials
		Measure the strength of an acid present in secondary batteries
		Determine the amount of acidity of a given samples.
		Calculate strength of iron present in a given sample

R23EEE-ES1202	Electrical & Electronics Engineering Workshop	Apply theoretical concepts to obtain calculations for the measurement of electrical parameters
		Analyse various characteristics of electrical circuits, electrical machines and measuring instruments.
		Design suitable circuits and methodologies for the measurement of various electrical parameters, Household and commercial wiring
		Summarize the characteristics of various electronic devices
		Summarize the characteristics of various electronic devices. Evaluate the electronic devices with simulation.
R23CIT-PC1202	Data Structures Lab	Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.
		Design, implement, and apply linked lists for dynamic data storage
		Develop programs using stacks and queues to handle recursive algorithms
		Apply tree traversal algorithms using linked lists on binary trees and binary search trees
		Design hash-based solutions for specific problems like collision resolution techniques
R23BSH-MC1201	NSS/NCC/Scouts & Guides/Community Service	Understand the importance of discipline, character and service motto
		Solve some societal issues by applying acquired knowledge, facts, and techniques
		Explore human relationships by analyzing social problems
		Determine to extend their help for the fellow beings and downtrodden people
		Develop leadership skills and civic responsibilities

R23REGULATION		
II YEAR– I SEMESTER		
R23BSH-MA2101	Mathematical Foundations for Computer Science	Analyze formal proofs using logical arguments through logical and analytical reasoning.
		Apply the core concepts of sets, relations, functions to computer science and engineering
		Apply graph theory, tree theory, and algorithms to solve problems in computer science.
		Apply the concepts of elementary number theory to cryptography.
		Apply suitable methods to solve computational problems involving recurrence relations.
R23BSH-HM2101	Universal Human Values: Understanding Harmony and Ethical Human Conduct	Implement elements and process of value education.
		Recognize thoughts, emotions and physical sensations of the self and the body and harmonizing their relationship.
		Analyze human relations and their role in ensuring harmonious society.
		Develop interconnected nature of existence encourages actions that contribute to global peace, justice and sustainability.
		Make use of humanistic constitution, mutual respect and universal human order with holistic technologies
R23ECE-ES2101	Digital Logic & Computer Organization	Explain different combinational logic circuits for the realization of digital logic circuits.
		Design and implement various synchronous and asynchronous sequential circuits using flip-flops.
		Design digital circuits using PLDs (PLA, PAL, PROM), comprehend the fundamental structure and operation of computers.

		Apply different addressing modes and I/O operations to optimize computational processes
		Illustrate the concepts of Memory and instruction Set execution in processing unit
R23CIT-PC2101	Python Programming	Implement Basic Python Programming Fundamentals for Computation of Expression.
		Apply Iterators and functions in data processing.
		Understand modules and packages to leverage powerful libraries for data science tasks.
		Implement sequences and data structures for data organization.
		Implement object-oriented principles in Python, handling run-time errors.
R23CIT-PC2102	Database Management Systems	Design the ER model using the basic concepts of DBMS
		Apply SQL concepts to Construct simple and complex queries.
		Analyze schema refinement techniques.
		Understand transaction serializability and concurrency control
		Apply the B & B+ Trees concepts on database storage.
R23CIT-PC2103	Python Programming LAB	Understand the working environment of python and its program structure.
		Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
		Implement Conditionals and Loops for Python Programs.
		Use Python Lists, Tuples and Dictionaries for representing compound data.
		Interpret the concepts of Object-Oriented Programming as used in Python
R23CIT-PC2104	Database Management Systems Lab	Design the ER model using the basic concepts of DBMS, and RDBMS
		Apply SQL commands such as DDL, DML, DCL, and TCL to access data from database objects.
		Applying String, Date, and Conversion Functions in DBMS

		Understand the procedure for writing Nested queries.
		Develop PL/SQL stored procedures, stored functions, cursors, and Triggers.
R23BSH-SC2101	English for Employability Skills (Skill Oriented Course)	Enable students to identify Parts of Speech and use them flawlessly, write Emails in formal correspondence effectively, participate confidently by introducing oneself in any formal discussion..
		Attain Language Proficiency & Accuracy through Contextualized Vocabulary, Verb forms, Tense and subject-verb agreement, produce coherent expressions for professional writing, and introduce themselves unhesitatingly with Task-Based Activities
		Develop the fluency and accuracy to write Technical Reports and Emails for professional communication by using appropriate vocabulary and participating confidently in formal discussions
		Assimilate lifelong reading habits to comprehend a passage for its gist. Avoid errors in both Speech & Writing and write Letters and Emails for official communication. Realise the technical communicative competence and attainment of grammatically correct structures for formal communication.
R23BSH-MC2101	Environmental Science (Mandatory Course)	Understand the significance of various natural resources, including renewable, non renewable water, minerals, forests and soil, in the environment and the problems associated with it in maintaining ecological balance and supporting human activities.
		Apply strategies for mitigating different types of environmental pollution, managing solid waste effectively and adopt individual actions that contribute to pollution prevention and waste reduction.
		Understand the structure, function, characteristic features of different kind of eco systems, value of biodiversity, threats to bio diversity and India's role and strategies in the conservation of biodiversity for sustainable development.
		Apply the Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, and Forest Conservation Act to promote sustainable environmental development; Address related social issues and propose effective solutions, delving into the intersection of environmental policies and community welfare to achieve ultimate sustainability goals
		Identify the role of information technology in addressing population-related problems, focusing on resource management, environmental monitoring, urban planning, healthcare improvement, education to enhance sustainability and quality of life..

II YEAR–II SEMESTER		
R23BSH-HM2201	Managerial Economics & Financial Analysis	Equipped with the knowledge of fundamentals of economics, estimating the Demand for a product, Capable of analyzing Elasticity & Forecasting methods.
		Apply production concepts, assess the costs and Determine Break Even Point (BEP)of an enterprise for managerial decision making.
		Identify the influence and price determination of various markets structures and knowledge of the forms of business organization and Business cycles
		Analyze how to invest adequate amount of capital in order to get maximum returnfrom selected business activity.
		Analyze and interpret the process & principles of accounting & apply financial statements for appropriate decisions to run the business profitably.
R23BSH-MA2201	Probability and Statistics	Apply descriptive statistical methods to summarize, visualize, and interpret data, enabling them to effectively communicate findings and insights in a data-driven context.
		Apply linear regression models and correlation techniques to decision-making by examining relationships between variables.
		Analyze real-world engineering problems using the concepts of probability theory and statistical distributions in the process of assessment and decision-making under uncertainty.
		Analyze data effectively to ensure accurate representation of populations in engineering studies and facilitate decision-making based on statistical inference using large sample tests.
		Analyze data effectively to ensure accurate representation of populations in engineering studies and facilitate decision-making based on statistical inference using small sample tests.
R23CIT-PC2201	Java Programming	Understand the Environment of Java Run-time Environment and Control Structures.
		Implement real-world objects using class Hierarchies.
		Implement programs using a collection Framework
		Implement exception handling and file handling
		Design GUI for real-time problems.
R23CIT-PC2202	Web Technologies	Analyze web pages and its attributes.
		Design web pages using XHTML and Cascading Styles sheets.
		Build dynamic web application using AJAX
		Build web applications using PHP.
		Apply scripting using PERL

R23CIT-PC2203	Operating Systems	Understand the importance of operating systems and different types of system calls.
		Analyze process scheduling algorithms and various IPC mechanisms.
		Understand the process synchronization, different ways for deadlocks handling.
		Analyze different page replacement methods, various File management techniques.
		Understand Android environment and behavior.
R23CIT-PC2204	Java Programming Lab	Understand the Environment of Java Run-time Environment and Control Structures.
		Implement real-world objects using class Hierarchies.
		Implement programs using a collection Framework
		Implement exception handling and file handling.
		Design GUI for real-time problems.
R23CIT-PC2205	Web Technologies Lab	Analyze a web page and identify its elements and attributes.
		Create web pages using XHTML, CSS and dynamic web page using Java script.
		Creating XML documents and AJAX.
		Creating simple applications using PHP and Perl.
		Creating a simple client – server application.

R23CIT-SC2201	Exploratory Data Analysis with Python (Skill Oriented Course)	Apply the concepts of R- functions to solve basic mathematics
		Implement R-programming codes using control statements.
		Applying R-data structures to solve problems..
		Understands data frames..
		Understand data visualization in R.
R23CIT-ES2201	Design Thinking for Innovation	Explain the fundamentals of Design Thinking and Innovation
		Apply the design thinking techniques for solving problems in various sectors.
		Analyze to work in a multidisciplinary environment.
		Evaluate the value of creativity.
		Formulate specific problem statements of real time issues.

R20REGULATION		
III YEAR-I SEMESTER		
R23CIT-PC3101	Computer Networks	Analyze different types of network topologies, various Reference models.
		Analyze network performance metrics and data transmission Techniques.
		Analyze different data link layer framing techniques and Link Layer Protocols.
		Analyze the medium access techniques and different routing algorithms.
		Understand various Application layer protocols.[L2]
R23CIT-PC3102	Data warehousing & Data Mining	Understand the process of knowledge discovery from data.
		Analyze the Data Pre-processing techniques.
		Apply classification techniques to various data sets.
		Apply the association rule mining to real time applications.
		Apply the clustering algorithms to various data sets.
R23CIT-PC3103	Automata Compiler Design	Understand finite automata.
		Design and develop lexical analyzers
		Analyze the working process of top-down parser.
		Analyze the working process of Bottom-up parser.
		Design the optimized code by applying optimization techniques.
R23CIT-PE3101.1	DevOps (Professional Elective - I)	Compare the traditional IT practices with DevOps practices.
		Apply CI/CD practices by designing and evaluating pipelines using tools such as Jenkins and GitLab CI.
		Deploy and manage applications using Docker containers and orchestrate them with Kubernetes.

		Analyze and implement configuration management and Infrastructure as Code automation using Ansible and Terraform.
		Understand the Integration of monitoring and security tools in DevOps
R23CIT-PE3101.2	Advanced Computer Architecture(Professional Elective-I)	Understand concepts of Evolution of Computer architecture.
		Apply memory organization and mapping techniques.
		Understand architectural features of advanced processors.
		Analyze the Memory hierarchy concepts
		Development of software to solve computationally intensive problems.
R23CIT-PE3101.3	Artificial Intelligence and Neural Network(Professional Elective-I)	Understand basics of Artificial Intelligence
		Apply the basic principles of AI in problem solving
		Understand the basics of Artificial Neural Networks
		Understand unsupervised learning approaches
		Understand unsupervised learning approaches
R23CIT-PC3104	Computer Networks Lab	Identify various networking devices and network cables
		Implement various simple and complex network topologies and configure the networking devices.
		Implement static and dynamic routing protocols .
		Implement the Network Services Configuration(DHCP,FTP)and VLANs.I
		Implement the class full addressing, sub netting planning to assign IP addresses .
R23CIT-PC3105	Data Mining Lab	Understand the various python packages for data preprocessing and analyzing data.

		Understand various pre-processing Techniques.
		Analyze various classification Algorithms.
		Apply the Association rule mining to various data sets to Extract Patterns.
		Analyze various clustering Algorithms.
R23CIT-SC3101	Angular JS (Skill Oriented Course)	Understand the fundamentals of Angular JS and its architecture.
		Apply data binding objects for implementing modules.
		Implement service and retrieve rest call data.
		Understand routes and their configuration in angular.
		Understand routes and their configuration in angular.
R23CIT-ES3101	Tinkering Lab	Gain hands-on experiences, learning from failures, and unstructured time to explore and invent.
		Apply the knowledge they gained till date to develop and conceptualize different scientific methods and/or techniques.
		Design experiment(s) with financial support and guidance to enhance themselves with technical applications.
R23BSH-MC3101	English and Soft Skills for Job Seekers (Mandatory Course)	Understand the grammatical forms of English and the use of these forms in specific communicative and professional writing.
		Improve their speaking ability in English, both in terms of fluency and comprehensibility by participating in Group discussions and oral assignments CO3: master interview skills for effective preparation and confident performance in diverse job scenarios.
		Demonstrate confidence and professionalism in job interviews and workplace interactions by effectively applying practiced soft skills.
		Demonstrate readiness for Higher education by effectively navigating its admission process.

III YEAR–II SEMESTER		
R23CIT-PC3201	Software Engineering & Object Oriented Analysis Design	Understand the need of Software Life Cycle Models
		Demonstrate the Requirements of the Software Systems process
		Analyze various testing techniques, Risk management and Software quality of the software products
		Create class diagrams that model both the domain model and design model of a software system
		Analyzed the conceptual model of UML.
		Create interaction diagrams and other diagrams that model the dynamic aspects of a software system.
		Detailed case study experience with architecture, analysis and design.
R23CIT-PC3202	Cryptography & Network Security	Understand the basics of Cryptography, the goals, services and mechanisms.
		Analyze the Symmetric Encryption Algorithms.
		Analyze the Asymmetric Cryptographic Algorithms.
		Understand the Digital signature Schemes.
		Understand the email security and system security.
R23CIT-PC3203	Machine Learning	Illustrate the characteristics of machine learning algorithms.
		Summarize the process of classification using decision tree approach.
		Apply Bayesian classifier to label data points an ML approach.
		Understand computational and instance-based learning.
		Understand advanced computational and types of learning.
R23CIT-PE3201.2	Design Analysis of Algorithms(Professional Elective Courses-II)	Understand the fundamentals of algorithms.
		Analyze the algorithms by applying the divide and conquer.

		Analyze the algorithm using greedy method.
		Apply and analyze different applications using dynamic programming.
		Apply and analyze the algorithm using back tracking with branch and bound method.
R23CIT-PE3201.2	Mobile Computing (Professional Elective Courses-II)	Understand the fundamentals of mobile Networks
		Apply knowledge in MAC, Network, and Transport Layer protocols of Wireless Network
		Comprehend, design, and develop a lightweight network stack
		Analyze the Mobile Network Layer system working
		Understand WAP Model
R23CIT-PE3201.3	E-Commerce (Professional Elective Courses-II)	Understand the basic concepts and technologies used in the field of management information systems
		Understand the processes of developing and implementing information systems
		Understand the ethical, social, and security issues of information systems and
		Understand the working functionalities of different gateways
		Understand the role of information systems in organizations, the strategic management processes, and the implications for the management and learn about the importance of managing organizational change associated with information systems implementation
R23CIT-PE3202.1	Distributed Systems (Professional Elective Courses-III)	Understand the characteristics of Distributed architecture.
		Apply inter process communication in a distributed environment.
		Apply standard protocols (RMI& RPC) in distributed systems.
		Understand the fundamentals of Distributed File systems.
		Analyze the Transactions and replications in distributed systems.
R23CIT-PE3202.2	Advanced Computer Network(Professional Elective Courses-III)	Apply CIDR notation to configure and analyze IP subnets
		Analyze the header format of IPv6 packets and compare it to IPv4 headers
		Analyze intra-domain and inter-domain routing and their protocols.
		Analyze the applications and services that utilize UDP, TCP & SCTP for Communication.
		Analyze the architecture of WWW and the functionalities of HTTP for Web Communication, MIME, POP & IMAP for E-mail Communication.

R23CIT-PE3202.3	Cloud Computing (Professional Elective Courses-III)	Understand different computing paradigms
		Understand the basics of cloud computing and different cloud deployment models.
		Understand different cloud implementation and management strategies.
		Understand different cloud service models.
		Analyze and use different cloud services/applications/tools available from key cloud providers.
R23CIT-PC3204	Software Engineering & Object Oriented Analysis & Design Lab	Design SRS documents for the software projects.
		Design classes diagrams for the software projects
		Design use case diagrams for the software projects
		Design flow diagrams for the software projects
		Design test for the software projects.
R23CIT-PC3205	Machine Learning Lab	Understand the statistical aspects of algorithms used in pre-processing.
		Design and evaluate supervised models for classification.
		Evaluate the machine learning models using unsupervised algorithms.
		Design and apply clustering algorithms for refinement of the data.
		Design, develop and test the performance of the machine learning model.
R23CIT-SC3101	Node Express JS (Skill Oriented Course)	Understand the Node's unique approach to asynchronous development.
		Understand the Node Package Manager (npm) and Modules.
		Implement Node JS applications with the Express framework and Connect Middleware.
		Learn in-depth practices for debugging and testing Node JS applications.
		Deploy Node JS applications in the cloud or on your own system.

R23CSM-MC3201	Technical Paper Writing & IPR (Mandatory Course)	Develop the technical writing skills, evaluate sources and properly cite references using appropriate citation styles.
		Construct clear and focused research proposal that address a specific gap in the advancement of knowledge in their field of study
		Assess needful elements, agencies responsible for Registration of IPR elements
		Analyze Copy right subject matters, Patent requirements, Infringement and Litigation.
		Outline the registration Processes of Trade Mark and Legal procedure stop revent cyber crimes