Department Name :-Computer Science & Engineering

UG Program Name :- B. Tech in Computer Engineering

Vision and Mission :-

Vision:
To excel in the computer science engineering discipline through continuous research, innovation and industry-oriented curriculum leading to responsible IT professionals.

Mission:
To inculcate teaching and learning process promoting state-of-the-art IT industry practices in computer science engineering and technology to address global challenges. To integrate academics, research and entrepreneurship skills to address present and future challenges of the society and industry. To develop professionalism with strong foundations adapting to changing technology.

Sr. No.	Program Outcomes
1.	Engineering Knowledge: Apply knowledge of mathematics, science, engineering fundamentals and engineering specialization to the solution of complex engineering problems.
2.	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3.	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4.	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5.	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6.	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7.	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8.	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9.	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10.	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give

Sr. No.	Program Outcomes
	and receive clear instructions.
11.	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12.	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Sr. No.	Program Specific Outcomes
1.	Apply knowledge of database management systems, data mining and analytics techniques to solve real world problems
2.	Apply knowledge of machine learning and intelligence to identify, formulate and solve complex engineering problems
3.	Design, develop and deploy software using emerging IT technologies like open source tools, mobile application development platforms, web technologies and cloud computing

Sr. No.	Semester	Course Code	Course Name	Course Outcome
	III	CS2011	Discrete Mathematics	1. Express mathematical statements using logical connectives. 2. Analyze and perform operations associated with sets. 3. Distinguish between relations and functions. 4. Describe the concept of lattices and boolean algebra. 5. Describe the concept of lattices and boolean algebra. 6. Apply graph theory concepts to solve problems of connectivity.
		CS2031	Data Structure using C	1. Compare between linear and non linear data structures 2. Describe the characteristics of various data structure such as stacks, queues, trees, graphs and Hash tables. 3. Apply appropriate abstract data types and algorithms to solve particular problems 4. Determine a suitable data structure and algorithm to solve a real world problem.

		CS2051	Data Communication & Networking	1. Build and understanding of the fundamental concepts of computer networking 2. Understand the concept of data communication and modulation techniques. 3. Comprehend the use of different types of transmission media and network devices 4. Analyze concept of error detection and correction in transmission of data 5. Acquire knowledge of flow control, error control and LAN protocols
		CS2071	Digital System & Microprocessor	1. Demonstrate different types of gates. 2. Develop modular combinational circuits using decoders 3. Apply the concepts of sequential logic and memory devices in digital systems 4. Describe the architecture, functions of microprocessor and its interfacing with peripheral devices. 5. Apply the programming techniques in developing the assembly language program for microprocessor system.
		CS2511	Data Structures using C Lab	1. Analyze basic data structures used in programming 2. Implement various data structures in C Language. 3. Implement basic algorithms in c language. 4. Choose appropriate data structures to develop an application. 5. Analyze and compare the static and dynamic implementations of various data structures.

		CS2531	Microprocessor Lab	1. Demonstrate boolean expressions, demorgan's law, and other operations using different types of gates 2. Design flipflops and counters using gates/flipflops 3. Apply the knowledge of tools and techniques used by practicing engineers to design, implement and debug microprocessor-based systems 4. Describe the architecture of the microprocessor, its peripheral devices, and basics of the instruction set 5. Design flowchart and use programming techniques to develop the assembly language program for microprocessor system
		CS2551	Data Communication & Networking Lab	1. Identify and explain the main components in a communication system 2. Design, Implement error detection and correction algorithm 3. Recognize network types and different models of network & networking components 4. Implement different Networking algorithms 5. Analyze to compare performance of different routing protocols using different tools

		SH2071	Statistics, Probability and Fuzzy Theory	1. Determine the co variance of bi variate data and understand the concept of correlation and regression analysis. 2. Restate and reproduce basic concepts of probability theory which stems from the analysis of chance and use it in problems related to computer science and engineering 3. Identify different probability distributions; apply them in problem solving 4. Define fuzzy sets, construct examples supporting to definition of fuzzy sets, demonstrate the knowledge of standard operations on fuzzy sets and differentiate crisp sets and fuzzy sets. 5. Apply extension principle to fuzzy arithmetic and solve fuzzy equations
	IV	CS2001	Theory of Computation	1. Describe the basic concepts of Theory of computation 2. Predict a grammar or regular Expression for given language 3. Design computation models for different language classes 4. Prove theorems in automata theory using its properties 5. Design an application using automata 6. Apply parsing strategies to parse given input.

		CS2021	Computer Networks	1. Identify the services and features provided by the network layer protocols to solve network-engineering problems. 2. Design and analyze performance of different routing algorithm. 3. Understanding the working principals, elements of transport layer protocols such as TCP, UDP. 4. Study on different application layer protocols such as HTTP, DNS, and SMTP. 5. To be able to design different data compression technique used in multimedia application
		CS2041	Computer Organization	1. To conceptualize basics of organizational and architectural issue ,functional unit of processor in digital computer and apply in computer organization 2. Construct the ability to perform computer arithmetic operations such as binary, signed, decimal, hexadecimal, floating point numbers. 3. Interpreting memory organization that uses banks for different word size operations and cache mapping techniques including translation, allocation. 4. Ability to understand input/output organization, data transfer techniques for computer. 5. To analyze processor performance improvement using instruction level parallelism in digital computer.

		CS2061	Software Engineering	1. Apply knowledge of software engineering principles to identify and solve real world problems. 2. Demonstrate the surveying and analyzing capabilities. 3. Work with different tools for software design, development and testing. 4. Work within teams.
		CS2521	Computer Network Lab	1. Design , Implement and analyze simple computer networks 2. Identify operations of TCP/UDP , FTP, HTTP, SNMP etc 3. Compare different networking models 4. Demonstrate an understanding of computer communication standards
		CS2541	Object Oriented Design and Programming Lab	1. Understand object-oriented design concepts & apply them in software system design. 2. Implement basic oop concepts like class & object, inline functions, dynamic memory allocations etc.. 3. Use constructors, destructors, function overloading, operator overloading, friend functions in c++. 4. Use c++ for implementing different types of inheritance and virtual functions. 5. Apply advanced features of c++ programming like exception handling, templates etc.

		CS2581	Mini Project-Environmental Science	1. Utilize scientific methods to solve environmental problems 2. Examine technologies for restoration of degraded environment 3. Develop presentation and report writing skills 4. Develop as an individual and in group leadership quality.
		CS2601	Free and Open Source Softwares Lab	1. Efficiently use foss environments & tools needed for software development 2. Collaborate in a network of Foss developers 3. Evaluate software development practices which exploit Foss 4. Apply Foss strategies in the software development life cycle
		SH2011	Environmental Science	1. Interpret impacts of human activities on natural resources and its control measures. 2. Apply ecological knowledge to solve environmental problems 3. Select the appropriate technology to control environmental pollution 4. Plan waste management and disaster management practices 5. Justify methods to assess impacts of developmental activities on environment 6. Analyze environmental change and its social impacts

2.	V	CS3011	Database Management Systems	1. Express terms related to database design and management. 2. Learn and apply the Relational Algebra structured Query Language (SQL) for database definition and manipulation. 3. Able to use of concept of Functional Dependency and decompose schema by applying certain normal forms. 4. Apply ethical computing concepts and practices to design database and implementation (security, concurrency control , recovery, deadlock handling) 5. An ability to design and create database to solve real world problem.
		CS3031	System Programming	1. Analyze the role of systems programming and be able to apply appropriate knowledge of computing and mathematics to solve systems programming problems. 2. Demonstrate the Concept of Concept of Lex&Yacc tool and formulate the aspect of Lex&Yacc program 3. Illustrate the concept of Logical analysis & design aspect of macro preprocessor program 4. Determine the aspect of LP activity of compiler for processing expressions 5. List the various s/w tools for program development using Debugging, Editors, User interfaces and DLL

		CS3051	Operating System	1. Differentiate various operating systems. 2. Discuss concept of process and threads. 3. Explain synchronization techniques. 4. Explain concept of deadlock and avoidance of it. 5. Discuss memory management in operating system. 6. Differentiate disk and file management in various operating systems.
		CS3071	Design and Analysis of Algorithm	1. Learn basic algorithmic strategies 2. Identify the appropriate algorithmic strategy suitable for given problem 3. Design an algorithm for given problem 4. Analyse complexity of algorithms 5. Solve the problems using appropriate algorithmic strategy 6. Prove or disprove the problem is np-class problem
		CS3091	Object Oriented Modeling & Design	1. Understand and compare the need of object oriented modeling with traditional methods. 2. Propose software system using requirements/feature lists, use cases, and simple of structural uml models 3. Demonstrate knowledge of functional and behavioral modeling techniques. 4. Design an software system based on advanced static/dynamic uml models 5. Design an software system based on advanced static/dynamic uml models 6. Analyze the application domain and requirements of the problem.

		CS3511	Database Management Systems Lab	1. Explain the real world organization where database management system is required 2. Analyse the need of perticular organization for dbms 3. Design and implement relational database management system 4. Develop database design with the help of open source tools 5. Experiment the rdbms tools such as sql/s/access 6. Work in team for database designing and application creation
		CS3531	Java Programming Lab	1. Apply Object Oriented concepts in Java. 2. Identify real world problem and develop application using java. 3. Design GUI for applications and application for database handling and networked architecture.
		CS3551	Self Learning	1. Study of domain specific knowledge for understanding the automation in different industries. 2. Apply and studied the Mathematical concepts required for research purpose. 3. Working with Inter-disciplinary topics. 4. Study of designing & analysis tools. 5. Search and present different Thesis and Research papers form international journals.

		SH353	Professional Skills	1. To develop contemporary English communication skills 2. To apply numerical reasoning skills in the analysis and interpretation of data. 3. To perform well to qualify screening tests in campus selection process and competitive examinations. 4. To be familiar with various aptitude tests 5. To describe various quantitative factors and values in business communication.
	VI	CS3001	Principles of Compiler Design	1. Discuss working of various phases of compiler 2. Apply scanning and parsing techniques on given grammar 3. Generate syntax tree and check the meaning of given input. 4. Apply appropriate techniques to optimize given input. 5. Generate intermediate code and resolve various issues in code generation
		CS3021	LINUX Operating System	1. Describe the basic concepts of linux operating system and linux shell commands. 2. Demonstrate various basic linux commands used for system administration. 3. Familiarize with linux file system, searching, extracting and archiving data. 4. Demonstrate linux commands for user& group management, network management and set permission & ownership of files.

		CS3041	Computer Graphics and Virtual Reality	1. To apply the mathematical techniques for representing points, lines, curves and surface in graphics 2. Design algorithms to draw lines, circle, polygons, etc 3. To demonstrate the knowledge of projections 4. Learn the basics of OpenGL and emerging technologies using openGL and GLUT libraries 5. To design a virtual environment 6. List and describe graphic devices used in virtual reality system
		CS3521	Computer Graphics and Virtual Reality Lab	1. Implement a and demonstrate 2D/3D transformations in computer graphics 2. Implement and Demonstrate the algorithms to display 2D basic primitives and clipping 3. Implement and Demonstrate representation of basic primitives using OpenGL 4. Develop mini-games/ graphical interface using OpenGl and GLUT libraries
		CS3541	Internet Technology Lab	1. Design and implement socket programming by using c, java and python languages 2. Develop and host website for commercial purpose 3. Build application oriented servers like ftp, dns etc 4. Develop wired and wireless topology along with featured of ns2 like using xgraph, nam 5. Analyze routing and audio video streaming protocols using ns-2 simulator.

		CS3561	.NET programming Lab	1. Understand the important features of .net framework technology. 2. Develop console and windows application by using c# language. 3. Understand and implement object oriented programming concepts like data encapsulation, data hiding, inheritance and polymorphism using c# language. 4. Implement advanced features of c# language like multi-threading, exceptions and delegates. 5. Design and develop project in team of 3-4 students using c# that for any real world problem using event handling, ado.net, multi-threading etc.
		CS3581	Mini Project-II Lab	1. Formulate a real world problem and develop its requirements. 2. Develop a design solution for a set of requirements. 3. Self learn new tools, algorithms, and/or techniques that contribute to the software solution of the project 4. Test and validate the conformance of the developed prototype against the original requirements of the problem 5. Work as a responsible member and possibly a leader of a team in developing software solutions and Decision making.

		CS3601	System Software Lab	1. Design and implement phases of the compiler 2. Build scanners and parsers using different tools 3. Build an application by applying concepts of compiler 4. Work as a responsible member and possibly a leader of a team in developing software solutions and Decision making.
	VII	CS4001	Parallel Programming Techniques	1. Identify compute intensive part from sequential algorithm. 2. Design parallel algorithm from given sequential algorithm. 3. Write parallel programs using openmp, cuda c/c++, etc. 4. Explore different compute intensive applications.
		CS4011	Advanced Database Systems	1. Evaluate and describe the fundamental theories and requirements that influence the design of modern database systems. 2. Describe and compare client-server, distributed & parallel database. 3. Make use of object relational database and xml for different application in database. 4. Demonstrate handling and administration of real time systems. 5. Discuss concept of data warehousing, security and different case studies like postgresql etc.

		CS4021	Information Security	1. Describe different methods of Data Encryption and Decryption; their advantages & limitations. 2. Apply different key distribution methods for distribution of Public/Private & Secret keys. 3. Apply message authentications techniques for implementing security during message communication. 4. Demonstrate the use of digital signature. 5. Analyze different security attacks & security solutions for e-mail & web applications.
		CS4031	Virtualization and Cloud Computing	1. Describe the fundamental concepts of cloud computing and its architecture. 2. Describe core concepts of virtualization and its relation to clouds. 3. Demonstrate the cloud deployment models using aneka and its programming models. 4. Apply the concurrent, high throughput and data intensive computing paradigms in real life scenarios. 5. Develop applications in science, engineering and life science problems using aneka programming models. 6. Analyze the use cloud computing in different domains and future research.

		CS4071	Recent IT Technologies	1. Define the terminology and describe concepts if recent trends in os 2. Use recent trends in databases 3. Explain latest trends and technologies in networking. 4. Apply concepts of recent trends in web technology. 5. Describe concepts of IoT
		CS4121	Enterprise Resource Planning	1. Explain concepts and applications of resources utilizing in enterprise resource planning (erp) systems 2. Applying methods and techniques of supply chain planning and crm 3. To develop working skills in planning and managing enterprise resources including aggregate planning, materials requirements planning, capacity management 4. Describe the role of business process re-engineering (brp) in erp implementation 5. Summarize the erp success rates, implementation strategies and related issues 6. Utilize erp software including the oracle erp system in supply chain planning and scheduling of enterprise resources

		CS4521	Mobile Application Development Lab	1. Formulating new ideas via researching existing apps. 2. Analyze limitations and features of developing for mobile devices 3. Analyze limitations and features of developing for mobile devices 4. Apply proficiency in coding on a mobile programming platform. 5. Develop mobile app with a significant programming component, involving the sensors and hardware features of the phone. 6. Adapt procedure of app deployment and marketing.
		CS4531	Web Technology Lab	1. Compare between static and dynamic web page. 2. Develop application using html5, css 3.0, java script and jquery. 3. Develop application using java servlet, manage session of users in web application. 4. Develop a java servlet application to connect with rdbms 5. Develop application using java server pages (jsp), manage session of users in web application. 6. Develop a java server pages application to connect with rdbms
		CS4541	Parallel Programming Lab	1. Design different parallel algorithms to solve compute intensive problems. 2. Use different parallel programming languages on multi-core and many-core systems. 3. Perform the analysis with different performance metrics.

		CS4551	Project Phase-I	1. Apply knowledge of computer science for real world problem 2. Possess professional, practical and reflective practitioner skills 3. Upgrade and apply the knowledge through continuous learning 4. Effectively apply design thinking processes and template to structure learning life cycle in the development of a prototype 5. To develop project management and time management skills 6. To formulate a process whereby to keep the end-user or customer in mind throughout the project lifecycle.
		CS4051	Soft Computing	1. Describe soft computing techniques and their role in problem-solving. 2. Discuss fuzzy logic system 3. Discuss evolutionary and swarm intelligence algorithms 4. Apply soft computing algorithms to real-time problems
	VIII Option-1 CS4551 Conventional Courses with Project	CS4081	Principles & Practices for IT Management	1. Describe concepts of requirements analysis, risk management, budgeting a project, creating a work breakdown structure. 2. Apply critical path and pert method for project scheduling and tracking. 3. Demonstrate resource allocation and scheduling concept. 4. Apply strategies, policies & strategic management in project development 5. Develop the different it application for various areas.

		CS4041	Big Data Analytics	1. Able to understand big data for business intelligence 2. Able to learn business case studies for big data analytics 3. Able to understand no sql big data management 4. Able to manage big data without sql 5. Able to understand map-reduce analytics using hadoop related tools
		CS4151	Machine Learning	1. Demonstrate concept of machine learning and collaborative filtering. 2. Apply clustering techniques for group identification and clustering. 3. Design solutions for the problem optimization and demonstrates bayesian filtering. 4. Demonstrates and builds models for recommendations.
		CS4191	Software Testing & Quality Assurance	1. Demonstrate various terms and technologies used in testing domain. 2. Apply the software testing techniques in commercial environments 3. Design different test plan and test cases for software quality improvement. 4. Choose suitable open source testing & automation tools. 5. Use various types of software tests and quality control standards

		CS45141	Software Testing & Quality Assurance Lab	1. Describe the fundamental concepts of software testing and quality assurance 2. Create and implement an effective software testing strategy. 3. Implement various test processes and continuous quality improvement. 4. Apply application of software testing techniques in commercial environments
		CS456	Project Phase-II	1. Apply knowledge of computer science for real world problem. 2. Upgrade and apply the knowledge through continuous learning. 3. Effectively apply Design Thinking Processes and Template to structure learning lifecycle in the development of a prototype. 4. To develop project management and time management skills 5. Effective track and report project status to management or project guide 6. To formulate a process whereby to keep the end-user or customer in mind throughout the project lifecycle.
		CS4581	Machine Learning Lab	1. Demonstrate concept of machine learning and collaborative filtering. 2. Apply clustering techniques for group identification and clustering. 3. Design solutions for the problem optimization and demonstrates bayesian filtering. 4. Demonstrates and builds models for recommendations.

		OE421	Network Administration	1. Identify the correct cable type required to connect two networks 2. Express working of internetworking models and need of OSI model 3. Differentiate between collision and broadcast domain 4. Identify ipv4 address and classify it 5. Express working of networking services like FTP, Telnet, DHCP and DNS 6. Design a network for given requirements
		OE422	Information Technology Foundation Program	1. Describe configuration of computer, various devices & system software's. 2. Apply object oriented concepts in real world scenario 3. Solve computational problems using data structures & algorithms 4. Design an er model for a given problem-domain 5. Implement small application using software development methodologies

	VIII Option-2 RE0407 Undergraduate Research Experience (URE)			1. Investigate the technical literature. 2. Recognize and evaluate theories, practices, and/or research on a chosen topic by conducting a thorough literature review and submitting a written integrative, critical summary of the current literature. 3. Design a research problem and develop a methodology. 4. Develop and implement an advanced original research or creative project. 5. Develop the ability to explain the conceptual viability of the project and describe the major components involved. 6. Develop the ability to explain how the project will impact the relevant body of work. 7. Develop advanced discipline-relevant skills and competencies. 8. Construct an accurate record of research performed. 9. Write a research report and paper.
	VIII Option-3 LL0407 Industry Internship & Project			1. Examine the functioning of the company on the terms of inputs, transformation process and the outputs (products and services) 2. Develop an attitude to adjust with the company culture, work norms, code of conduct. 3. Recognize and follow the safety norms, Code of conduct. 4. Demonstrate the ability to observe, analyze and document the details as per the industry practices. 5. Interpret the processes, systems and procedures and to relate to the theoretical concepts- studies. 6. Improve the leadership abilities, communication. 7. Demonstrate project management and finance sense

	VIII Option-4 ED 4001 Entrepreneurship Development			1. Determine distinct entrepreneurial traits 2. Recognize the parameters to assess opportunities and constraints for new business ideas 3. Apply the systematic practice to select and screen a business idea 4. Design strategies for successful implementation of ideas 5. Design a business plan