"EMPOWERMENT THROUGH TECHNOLOGICAL EXCELLENCE"

GENBA SOPANRAO MOZE TRUST'S

GENBA SOPANRAO MOZE COLLEGE OF ENGINEERING
(Recognized by AICTE, New Delhi; Approved by Govt. of Maharashtra; Affiliated to Pune University)
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Department of _____

Course Outcomes

SE

Course Code	**Subject:** Discrete Mathematics
210241	• Solve real world problems logically using appropriate set, function, and relation models and interpret the associated operations and terminologies in context. • Analyze and synthesize the real world problems using discrete mathematics.
	Subject : Digital Electronics & Logic Design
210242	Realize and simplify Boolean Algebraic assignments for designing digital circuits using KMaps. • Design and implement Sequential and Combinational digital circuits as per the specifications. • Apply the knowledge to appropriate IC as per the design specifications. • Design simple digital systems using VHDL. • Develop simple embedded system for simple real world applicatio
210243	**Subject :** Data Structures and Algorithms
	• To discriminate the usage of various structures in approaching the problem solution. • To design the algorithms to solve the programming problems. • To use effective and efficient data structures in solving various Computer Engineering domain problems.

	• To analyze the problems to apply suitable algorithm and data structure. • To use appropriate algorithmic strategy for better efficiency
210244	**Subject :** Computer Organization and Architecture
	• Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os. • Analyze the principles of computer architecture using examples drawn from commercially available computers. • Evaluate various design alternatives in processor organization
210245	**Subject :** Object Oriented Programming
	• Analyze the strengths of object oriented programming • Design and apply OOP principles for effective programming • Develop programming application using object oriented programming language C++ • Percept the utility and applicability of OOP
210249	**Subject : Soft Skills**
	• Effectively communicate through verbal/oral communication and improve the listening skills • Write precise briefs or reports and technical documents. • Actively participate in group discussion / meetings / interviews and prepare & deliver presentations. • Become more effective individual through goal/target setting, self motivation and practicing creative thinking. • Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.
207003	**Subject :** Engineering Mathematics III
	• Solve higher order linear differential equation using appropriate techniques for modelling and analyzing electrical circuits. • Solve problems related to Fourier transform, Z-Transform and applications to Signal and Image processing. • Apply statistical methods like correlation, regression analysis and probability

	theory for analysis and prediction of a given data as applied to machine intelligence. • Perform vector differentiation and integration to analyze the vector fields and apply to compute line, surface and volume integrals. • Analyze conformal mappings, transformations and perform contour integration of complex functions required in Image processing, Digital filters and Computer graphics.
210251	Computer Graphics
	• Apply mathematics and logic to develop Computer programs for elementary graphic operations • Develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics • Develop the competency to understand the concepts related to Computer Vision and Virtual reality • Apply the logic to develop animation and gaming programs
210252	Advanced Data Structures
	• To apply appropriate advanced data structure and efficient algorithms to approach the problems of various domain. • To design the algorithms to solve the programming problems. • To use effective and efficient data structures in solving various Computer Engineering domain problems. • To analyze the algorithmic solutions for resource requirements and optimization • To use appropriate modern tools to understand and analyze the functionalities confined to the data structure usage.
210253	Microprocessor
	• To apply the assembly language programming to develop small real life embedded application. • To understand the architecture of the advanced processor thoroughly to use the resources for programming • To understand the higher processor architectures descended from 80386 architecture

210254	Principles of Programming Languages
	• To analyze the strengths and weaknesses of programming languages for effective and efficient program development. • To inculcate the principles underlying the programming languages enabling to learn new programming languages. • To grasp different programming paradigms • To use the programming paradigms effectively in application development.

TE

Course Code	**Subject:** Data Structures and Algorithms
314441	1. To construct finite state machines to solve problems in computing. 2. To write mathematical expressions for the formal languages 3. To apply well defined rules for syntax verification. 4. To construct and analyze Push Down, Post and Turing Machine for formal languages. 5. To express the understanding of the decidability and decidability problems. 6. To express the understanding of computational complexity
314442	DATABASE MANAGEMENT SYSTEMS
	1. To define basic functions of DBMS & RDBMS. 2. To analyze database models & entity relationship models. 3. To design and implement a database schema for a given problem-domain. 4. To populate and query a database using SQL DML/DDL commands. 5. Do Programming in PL/SQL including stored procedures, stored functions, cursors and packages. 6. To appreciate the impact of analytics and big data on the information industry and the external ecosystem for analytical and data services.
314443	SOFTWARE ENGINEERING AND PROJECT MANAGEMENT
	1. To identify unique features of various software application domains and classify software applications. 2. To choose and apply appropriate lifecycle model of software development.

	3. To describe principles of agile development, discuss the SCRUM process and distinguish agile process model from other process models. 4. To analyze software requirements by applying various modelling techniques. 5. To list and classify CASE tools and discuss recent trends and research in software engineering. 6. To understand IT project management through life cycle of the project and future trends in IT Project Management.
314444	OPERATING SYSTEM
	1. Fundamental understanding of the role of Operating Systems. 2. To understand the concept of a process and thread. 3. To apply the cons of process/thread scheduling. 4. To apply the concept of process synchronization, mutual exclusion and the deadlock. 5. To realize the concept of I/O management and File system. 6. To understand the various memory management techniques.
314445	HUMAN-COMPUTER INTERACTION
	1. To explain importance of HCI study and principles of user-centred design (UCD) approach. 2. To develop understanding of human factors in HCI design. 3. To develop understanding of models, paradigms and context of interactions. 4. To design effective user-interfaces following a structured and organized UCD process. 5. To evaluate usability of a user-interface design. 6. To apply cognitive models for predicting human-computer-interactions.
314446	SOFTWARE LABORATORY - I
	1. To install and configure database systems. 2. To analyze database models & entity relationship models. 3. To design and implement a database schema for a given problem-domain 4. To understand the relational and document type database systems. 5. To populate and query a database using SQL DML/DDL commands. 6. To populate and query a database using MongoDB commands.

314447	SOFTWARE LABORATORY – II
	1. To understand the basics of Linux commands and program the shell of Linux. 2. To develop various system programs for the functioning of operating system. 3. To implement basic building blocks like processes, threads under the Linux. 4. To develop various system programs for the functioning of OS concepts in user space like concurrency control and file handling in Linux. 5. To design and implement Linux Kernel Source Code. 6. To develop the system program for the functioning of OS concepts in kernel space like embedding the system call in any Linux kernel.
314448	SOFTWARE LABORATORY – III
314450	COMPUTER NETWORK TECHNOLOGY
	1. To know Responsibilities, services offered and protocol used at each layer of network. 2. To understand different addressing techniques used in network. 3. To know the difference between different types of network. 4. To know the different wireless technologies and IEEE standards. 5. To use and apply the standards and protocols learned, for application development. 6. To understand and explore recent trends in network domain.
314451	SYSTEMS PROGRAMMING
	1. To learn independently modern software development tools and creates novel solutions for language processing applications. 2. To design and implement assemblers and macro processors. 3. To use tool LEX for generation of Lexical Analyzer. 4. To use YACC tool for generation of syntax analyzer. 5. To generate output for all the phases of compiler. 6. To apply code optimization in the compilation process.
314452	DESIGN AND ANALYSIS OF ALGORITHMS
	1. To calculate computational complexity using asymptotic notations for various algorithms. 2. To apply Divide & Conquer as well as Greedy approach to design algorithms.

	3. To practice principle of optimality. 4. To illustrate different problems using Backtracking. 5. To compare different methods of Branch and Bound strategy. 6. To explore the concept of P, NP, NP-complete, NP-Hard and parallel algorithms.
314453	CLOUD COMPUTING
	1. To understand the need of Cloud based solutions. 2. To understand Security Mechanisms and issues in various Cloud Applications 3. To explore effective techniques to program Cloud Systems. 4. To understand current challenges and trade-offs in Cloud Computing. 5. To find challenges in cloud computing and delve into it to effective solutions. 6. To understand emerging trends in cloud computing.
314454	DATA SCIENCE AND BIG DATA ANALYTICS
	1. To understand Big Data primitives. 2. To learn and apply different mathematical models for Big Data. 3. To demonstrate their Big Data learning skills by developing industry or research applications. 4. To analyze each learning model come from a different algorithmic approach and it will perform differently under different datasets. 5. To understand needs, challenges and techniques for big data visualization. 6. To learn different programming platforms for big data analytics.
314455	SOFTWARE LABORATORY - IV
	1. To implement small size network and its use of various networking commands. 2. To understand and use various networking and simulations tools. 3. To configure various client/server environments to use application layer protocols 4. To understand the protocol design at various layers. 5. To explore use of protocols in various wired and wireless applications. 6. To develop applications on emerging trends.
314456	SOFTWARE LABORATORY - V
	1. To design and implement two pass assembler for hypothetical machine instructions.

	2. To design and implement different phases of compiler (Lexical Analyzer, Parser, Intermediate code generation) 3. To use the compile generation tools such as “Lex" and "YACC”. 4. To apply algorithmic strategies for solving various problems. 5. To compare various algorithmic strategies. 6. To analyze the solution using recurrence relation.
314457	SOFTWARE LABORATORY - VI
	1. To apply Big data primitives and fundamentals for application development. 2. To explore different Big data processing techniques with use cases. 3. To apply the Analytical concept of Big data using R/Python. 4. To visualize the Big Data using Tableau. 5. To design algorithms and techniques for Big data analytics. 6. To design Big data analytic application for emerging trends.
314458	PROJECT BASED SEMINAR
	1. To Gather, organize, summarize and interpret technical literature with the purpose of formulating a project proposal. 2. To write a technical report summarizing state-of-the-art on an identified topic. 3. Present the study using graphics and multimedia presentations. 4. Define intended future work based on the technical review. 5. To explore and enhance the use of various presentation tools and techniques. 6. To understand scientific approach for literature survey and paper writing.

BE

Course Code	**Subject: Information and Cyber Security**
414453	1. Use basic cryptographic techniques in application development.2. Apply methods for authentication, access control, intrusion detection and prevention. 3. To apply the scientific method to digital forensics and perform forensic investigations. 4. To develop computer forensics awareness. 5. Ability to use computer forensics tools.
414454:	Machine Learning and Applications

	1. Model the learning primitives. 2. Build the learning model. 3. Tackle real world problems in the domain of Data Mining and Big Data Analytics, Information Retrieval, Computer vision, Linguistics and Bioinformatics.
414455:	Software Design and Modeling
	1. Understand object oriented methodologies, basics of Unified Modeling Language (UML). 2. Understand analysis process, use case modeling, domain/class modeling 3. Understand interaction and behavior modeling. 4. Understand design process and business, access and view layer class design 5. Get started on study of GRASP principles and GoF design patterns. 6. Get started on study of architectural design principles and guidelines in the various type of application development.
414456A: Elective-I	Wireless Communications
	1. Understand the basics of propagation of radio signals. 2. Understand the basic concepts of basic Cellular System and the design requirements. 3. Have an understanding of the basic principles behind radio resource management techniques such as power control, channel allocation and handoffs. 4. Gain insights into various mobile radio propagation models and how the diversity can be exploited to improve performance. 5. Gain knowledge and awareness of the technologies for how to effectively share spectrum through multiple access techniques i.e. TDMA, CDMA, FDMA etc. 6. Have in-depth understanding of the design consideration and architecture for different Wireless Systems like GSM, CDMA, GPRS etc. 7. Understanding of the emerging trends in Wireless communication like WiFi, WiMAX, Software Defined Radio (SDR) and related issues and challenges.
414456B: Elective-I	Natural Language Processing
	1. Understand automatic processing of human languages using computers. 2. Understand various applications of natural language processing.

414456C: Elective-I	Usability Engineering
	1. Justify the theory and practice of usability evaluation approaches, methods and techniques. 2. Compare and evaluate strengths and weaknesses of various approaches, methods and techniques for evaluating usability. 3. Design and implement a usability test plan, based on modelling or requirements specification. 4. Choose appropriate approaches, methods and techniques to evaluate the usability of a specified interactive system.
414456D: Elective-I	Multicore and Concurrent Systems
	1. Know types of parallel machine and to know multicore and concurrent systems in detail. 2. Know the ways to measure the performance of multicore systems. 3. Understand need of multicore and concurrent system programming. 4. Know the different approaches for multicore and concurrent programming. 5. Use and apply the approaches learned, for application development. 6. Understand and explore recent trends in multicore and concurrent system programming.
414456E: Elective-I	Business Analytics and Intelligence
	1. Comprehend the Information Systems and development approaches of Intelligent Systems. 2. Evaluate and rethink business processes using information systems. 3. Propose the Framework for business intelligence. 4. Get acquainted with the Theories, techniques, and considerations for capturing organizational intelligence. 5. Align business intelligence with business strategy. 6. Apply the techniques for implementing business intelligence systems.

414457A: Elective-II	Software Defined Networks
	1. Acquire fundamental knowledge of SDN exploring the need, characteristics, and architecture of SDN. 2. Recognize OpenFlow protocols and its forwarding, pipeline model. 3. Understand different methodologies for sustainable SDN. 4. Comprehend IT Infrastructure for SDN. 5. Acquiring knowledge of OpenFlow protocols, visualization.
414457B: Elective-II	Soft Computing
	1. Tackle problems of interdisciplinary nature. 2. Find an alternate solution, which may offer more adaptability, resilience and optimization. 3. Gain knowledge of soft computing domain which opens up a whole new career option. 4. Tackle real world research problems.
414457C: Elective-II	Software Testing and Quality Assurance
	1. Test the software by applying testing techniques to deliver a product free from bugs. 2. Investigate the scenario and to select the proper testing technique. 3. Explore the test automation concepts and tools and estimation of cost, schedule based on standard metrics. 4. Understand how to detect, classify, prevent and remove defects. 5. Choose appropriate quality assurance models and develop quality. 6. Ability to conduct formal inspections, record and evaluate results of inspections.
414457D: Elective-II	Compiler Construction
	1. Understand the structure of compilers. 2. Understand the basic and advanced techniques used in compiler construction.

	3. Understand the basic data structures used in compiler construction such as abstract syntax. 4. Cognitive skills (thinking and analysis)- Design and implement a compiler using a software engineering approach. 5. Communication skills (personal and academic). 6. Practical and subject specific skills (Transferable Skills) - Use generators (e.g. Lex and Yacc).
414457E: Elective-II	Gamification
	1. Write programs to solve problems using gamification and open source tools. 2. Apply gamification for Mobile and Web Applications. 3. Solve problems for multi-core or distributed, concurrent/Parallel environments
414458:	Computer Laboratory VII
	1. The students will be able to implement and port controlled and secured access to software systems and networks. 2. The students will be able to build learning software in various domains.
414459:	Computer Laboratory VIII
	1. Draw, discuss different UML 2.0 diagrams, their concepts, notation, advanced notation, forward and reverse engineering aspects. 2. Identify different software artifacts used to develop analysis and design model from requirements. 3. Develop use case model. 4. Develop, implement analysis model and design model. 5. Develop, implement Interaction and behavior Model. 6. Implement an appropriate design pattern to solve a design problem.
414460:	Project Phase-I
	1. To show preparedness to study independently in chosen domain of Information Technology and programming languages and apply their acquired knowledge to variety of real time problem scenarios. 2. To function effectively as a team to accomplish a desired goal.

	3. An understanding of professional, ethical, legal, security and social issues and responsibilities related to Information Technology Project.
414461:	Audit Course-V
414461A:	Audit Course-V Emotional Intelligence
	1) Expand your knowledge of emotional patterns in yourself and others. 2) Discover how you can manage your emotions, and positively influence yourself and others. 3) Build more effective relationships with people at work and at home. 4) Positively influence and motivate colleagues, team members, and managers. 5) Increase your leadership effectiveness by creating an atmosphere that engages others. 6) Apply EI behaviours and supports high performance
414461B:	Audit Course-V Green Computing
	1) Understand the concept of green IT and relate it to sustainable development. 2) Apply the green computing practices to save energy. 3) Discuss how the choice of hardware and software can facilitate a more sustainable operation. 4) Use methods and tools to measure energy consumption
414461C:	Audit Course-V Critical Thinking
	1) If students whole-heartedly participate in the course, they can expect to be smarter, stronger and more confident thinkers. 2) They can embark on a life-long journey of “self-directed learning”.
414461D:	Audit Course-V Statistical Learning Model using
	1) Students will be familiar with concepts related to “data science”, ”analytics”, “machine learning”, etc. These are important topics, and will enable students to embark on highly rewarding careers. 2) Students will capable of learning “big data” concepts on their own

414462:	Distributed Computing System
	1. Understand the principles and desired properties of distributed systems based on different application areas. 2. Understand and apply the basic theoretical concepts and algorithms of distributed systems in problem solving. 3. Recognize the inherent difficulties that arise due to distributed-ness of computing resources. 4. Identify the challenges in developing distributed applications
414463:	Ubiquitous Computing
	1. Demonstrate the knowledge of design of Ubicomp and its applications. 2. Explain smart devices and services used Ubicomp. 3. Describe the significance of actuators and controllers in real time application design. 4. Use the concept of HCI to understand the design of automation applications. 5. Classify Ubicomp privacy and explain the challenges associated with Ubicomp privacy. 6. Get the knowledge of ubiquitous and service oriented networks along with Ubicomp management.
414464A:	Elective III Internet of Things (IoT)
	1. Explain what is internet of things. 2. Explain architecture and design of IoT. 3. Describe the objects connected in IoT. 4. Understand the underlying Technologies. 5. Understand the platforms in IoT. 6. Understand cloud interface to IoT.
414464A:	Elective III Internet of Things Laboratory
	1. To understand IoT platforms such as Raspberry-Pi/Beagle board/Arduino. 2. To understand operating systems for platforms such as Raspberry-Pi/Beagle board/Arduino. 3. To communicate with objects using IoT platforms such as Raspberry-Pi/Beagle board/Arduino.

	4. To interface cloud environment for IoT application. 5. To implement IoT related protocols such as MQTT / CoAP etc. 6. To implement the web interface for IoT
414464B:	Elective III Information Storage and Retrieval
	1. Understand the concept of Information retrieval. 2. Deal with storage and retrieval process of text and multimedia data. 3. Evaluate performance of any information retrieval system. 4. Design user interfaces. 5. Understand importance of recommender system. 6. Understand concept of multimedia and distributed information retrieval.
414464B:	Information Storage and Retrieval Laboratory
	1. Understand the concept, data structure and preprocessing algorithms of Information retrieval. 2. Deal with storage and retrieval process of text and multimedia data. 3. Evaluate performance of any information retrieval system. 4. Design user interfaces. 5. Understand importance of recommender system (Take decision on design parameters of recommender system). 6. Understand concept of multimedia and distributed information retrieval. 7. Map the concepts of the subject on recent developments in the Information retrieval field.
414464C:	Elective III Multimedia Techniques
	1. To create own file formats for specific application. 2. To do some projects based on current trends in multimedia. 3. To use open sources for authoring tool for animation and presentations. 4. Understand some research areas of current multimedia techniques.
414464C:	Multimedia Techniques Laboratory
	1. To create own file formats for specific application. 2. To do some projects based on current trends in multimedia. 3. To use open sources for authoring tool for animation and presentations
414464D:	Elective III Internet and Web Programming

	1. Demonstrate static website using basic tools. 2. Develop client side programming skills. 3. Develop server side programming skills. 4. Understand web services and handle content management tools. 5. Develop mobile website using mobile web development tools. 6. Understand aspects of web security and cyber ethics.
414464D:	Internet and Web Programming Laboratory
	1. Use fundamental skills to develop and maintain website and web application. 2. Apply scripting skills for Server side and Client-side Programming. 3. Develop web services to transfer data and add interactive components to website. 4. Combine multiple web technologies to create advanced web components.
414464E:	Elective III Computational Optimization
	1. Learn and implement various optimization techniques. 2. Learn model real-world problems in optimization framework. 3. Apply various optimization models to solve optimization problems in computer-science & IT Engineering.
414464E:	Computational Optimization Laboratory
	1. Understand Transportation problem. 2. Learn different measures in shortest path algorithms. 3. Understand and learn Queuing Model.
414465A:	Elective IV Rural Technologies and Community Development
	1. Understand rural development model. 2. Learn different measures in rural development and its impact on overall economy. 3. Understand and learn importance of technologies in rural and community development. 4. Understand challenges and opportunities in rural development.
414465B:	Elective IV Parallel Computing
	1. Understand fundamentals in parallel computing. 2. Understand and learn importance of technologies including different hardware

	structures used in parallel computing. 3. Understand challenges and opportunities in parallel computing
414464C:	Elective IV Computer Vision
	1. Implement fundamental image processing techniques required for computer vision. 2. Implement boundary tracking techniques. 3. Apply Hough Transform for line, circle, and ellipse detections. 4. Implement motion related techniques. 5. Develop skills to develop applications using computer vision techniques.
414464D:	Elective IV Social Media Analytics
	1. Understand the basics of Social Media Analytics. 2. Explain the significance of Data mining in Social media. 3. Demonstrate the algorithms used for text mining. 4. Apply network measures for social media data. 5. Explain Behavior Analytics techniques used for social media data. 6. Apply social media analytics for Face book and Twitter kind of applications.
414465E:	Elective IV Open Elective
414466	COMPUTER LABORATORY-IX
	1. Demonstrate knowledge of the core concepts and techniques in distributed systems. 2. Learn how to apply principles of state-of-the-Art Distributed systems in practical application. 3. Design, build and test application programs on distributed systems.
414467:	COMPUTER LABORATORY-X
	1. Set up the Android environment and explain the Evolution of cellular networks. 2. Develop the User Interfaces using pre-built Android UI components. 3. Create applications for performing CURD SQLite database operations using Android. 4. Create the smart android applications using the data captured through sensors. 5. Implement the authentication protocols between two mobile devices for providing. Security.

	6. Analyze the data collected through android sensors using any machine learning algorithm.
414468:	Project Work
	1. Learn teamwork. 2. Be well aware about Implementation phase. 3. Get exposure of various types of testing methods and tools. 4. Understand the importance of documentation.
414461:	Audit Course-VI
414469A:	Audit Course-VI IoT Applications in Engineering Field.
	By the end of the course, students should be able to 1. Expand your knowledge of Internet of Things. 2. Discover how you can use IoT in your Engineering applications. 3. Build more effective hands on with IoT elements. 4. Expand the practical knowledge of using IoT components like sensors, processors. 5. Expand the understanding of using different protocols.
414469B:	Audit Course-VI Entrepreneurship
	1. Expand your knowledge of Entrepreneurship & Startups. 2. Discover how you can use Entrepreneur Qualities. 3. Expand the practical knowledge of Finance, Legal-Patents, Intellectual Property, and Business Associations. 4. Expand the understanding of Deliverables & Achieving Target.
414469C:	Audit Course-VI Cognitive computing
	1. Understand and discuss what cognitive computing is, and how it differs from traditional approaches. 2. Plan and use the primary tools associated with cognitive computing. 3. Plan and execute a project that leverages cognitive computing. 4. Understand and discuss the business implications of cognitive computing.
414469D:	Audit Course-VI AI and Robotics

	1. The goal of this course is to familiarize the students with the basic concepts of robotics, artificial intelligence and intelligent machines. 2. It will help students to understand and apply principles, methodology and techniques of intelligent systems to robotics.