Hope Foundation's
International Institute of Information Technology
P-14, Rajiv Gandhi Info Tech Park, Phase – 1, Hinjawadi, Pune – 411 057

Department of Information Technology

Course Outcomes (COs)

SE (Information Technology) -2015 Pattern

Course Code	Name of Subject/ Course	Course Outcome (COs)
214441	Discrete Structures	❑ Students will be able to use the permutation and combination technique to solve discrete and conditional probability problems. ❑ Apply the propositional logic, and set theory concepts to solve computational problems. ❑ Apply knowledge of relations and functions to formulate mathematical models for real life situations ❑ Apply concepts of graph theory to design computational problems and optimization techniques ❑ Use tree concepts in searching, scheduling and classification problems. ❑ Able to form coding and decoding systems by using various algebraic structures
214442	Computer Organization & Architecture	❑ Solve problems based on computer arithmetic. ❑ Explain processor structure & its functions. ❑ Obtain knowledge about micro-programming of a processor. ❑ Understand concepts related to memory & IO organization. ❑ Acquire knowledge about instruction level parallelism & parallel organization of multiprocessors & multi core systems
214443	Digital Electronics and Logic Design	❑ Spectacle an awareness and apply knowledge of number systems, codes, Boolean algebra and use necessary A.C, D.C Loading characteristics as well as functioning while designing with logic gates. ❑ Use logic function representation for simplification with K-Maps and analyze as well as design Combinational logic circuits using SSI & MSI chips. ❑ Analyze Sequential circuits like Flip-Flops (Truth Table, Excitation table), their conversion & design the applications. ❑ Identify the Digital Circuits, Input/Outputs to replace by FPGA ❑ Use VHDL programming technique with different modeling styles for any digital circuits

214444	Fundamental of data structures	❑ Student will be able to apply appropriate constructs of C language, coding standards for application development. ❑ Students will be to use dynamic memory allocation concepts and file handling in various application developments. ❑ Students will be able to perform basic analysis of algorithms with respect to time and space complexity. ❑ Students will be able to select appropriate searching and/or sorting techniques in the application development. ❑ Students will be able to select and use appropriate data structures for problem solving and programming. ❑ Students will be able to use algorithmic foundations for solving problems and programming.
214445	Problem Solving and Object Oriented programming	❑ Develop algorithms for solving problems by using modular programming concepts ❑ Abstract data and entities from the problem domain, build object models and design software solutions using object-oriented principles and strategies ❑ Discover, explore and apply tools and best practices in object-oriented programming ❑ Develop programs that appropriately utilize key object-oriented concepts ❑ Analyze the strengths of Object Oriented Programming ❑ Develop programming application using object oriented programming language C++
214446	Digital Laboratory	❑ Spectacle an awareness and apply knowledge and concepts and methods of digital system design techniques as hands-on experiments with the use of necessary A.C, D.C Loading characteristics. ❑ Use logic function representation for simplification with K-Maps and analyze as well as design Combinational logic circuits using SSI & MSI chips. ❑ Analyze Sequential circuits like Flip-Flops (Truth Table, Excitation table) & design the applications like Asynchronous and Synchronous Counters. ❑ Design Sequential Logic circuits: Sequence generators, MOD counters with registers/Counters using synchronous /asynchronous counters. ❑ Understand the need of skills, techniques and learn state-of-the-art engineering tools through hands-on experimentation on the Xilinx tools for design as well as the basics of VHDL. ❑ Understand and implement the design Steps, main programming technique with different modeling styles for any digital circuits with VHDL Programming.
214447	Programming Laboratory	❑ Student will be able to apply appropriate constructs of C language, coding standards for application development. ❑ Students will be able to use dynamic memory allocation concepts and file handling in various application developments. ❑ Students will be able to select appropriate searching and/or sorting techniques in the application development and able to do analysis of algorithm.

		❑ Students will be able to select and use appropriate data structures for problem solving and programming and able to do analysis of algorithm. ❑ Students will be able to use algorithmic foundations for solving problems and programming.
214448	Object Oriented programming Lab.	❑ Break a problem into logical pieces and develop algorithms for solving simple problems. ❑ Abstract data and entities from the problem domain, build object models and design software solutions using object-oriented principles and strategies. ❑ Discover, explore and apply tools and best practices in object-oriented programming. ❑ Develop programs that appropriately utilize key object-oriented concepts.
214449	Communication Skills	❑ Provides an ability to understand, analyze and interpret the essentiality of grammar and its proper usage. ❑ Build the students' vocabulary by means of communication via web, direct Communication and indirect communication. ❑ Improves Students' Pronunciation skills and understanding between various phonetic sounds during communication ❑ Understanding the various rules and means of written communication ❑ Effective communication with active listening, facing problems while communication and how to overcome it.
207003	Engineering Mathematics -III	❑ Solve higher order linear differential equations to understand appropriate techniques of 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 and regression analysis, Measures of central tendency and its applications. ❑ Understand probability theory and its applications. Probability distributions. Analysis and prediction of data as applied to machine intelligence ❑ Perform vector differentiation and integration to analyse 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.
214450	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 ❑ Develop the competency to understand the concepts related to Virtual reality ❑ Apply the logic to develop animation ❑ Apply the logic to develop gaming programs

214451	Processor Architecture and Interfacing	❑ Learn architectural details of 80386 microprocessor ❑ Understand memory management and multitasking of 80386 microprocessor ❑ Understand architecture and memory organization of 8051microcontroller ❑ Explain timers and interrupts of 8051 microcontroller and its interfacing with I/O devices.
214452	Data Structures & Files	❑ Basic ability to analyze algorithms and to determine algorithm correctness and time efficiency class. ❑ Understand different advanced abstract data type (ADT) and data structures and their implementations. ❑ Understand different algorithm design techniques (brute - force, divide and conquer, greedy, etc.) and their implementation ❑ Ability to apply and implement learned algorithm design techniques and data structures to solve problems
214453	Foundations of Communication and Computer Network	❑ Understand data/signal transmission over communication media ❑ Recognize usage of various modulation techniques in communication ❑ Analyze various spread spectrum and multiplexing techniques ❑ Use concepts of data communication to solve various related problems ❑ Understand error correction and detection techniques ❑ Acquaint with transmission media and their standards
214454	Processor Interfacing Laboratory	❑ Learn and apply concepts related to assembly language programming ❑ Write and execute assembly language program to perform array addition, code conversion, block transfer, sorting and string operations ❑ Learn and apply interfacing of real world input and output devices to 8051 microcontroller
214455	Data Structure and Files Laboratory	❑ Analyze algorithms and to determine algorithm correctness and time efficiency class ❑ Understand different advanced abstract data type (ADT) and data structures and their implementations ❑ Understand different algorithm design techniques (brute - force, divide and conquer, greedy, etc.) and their implementation ❑ Apply and implement learned algorithm design techniques and data structures to solve problems.
214456	Computer Graphics Laboratory	❑ 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

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Department of Information Technology

Course Outcomes (COs)

TE (Information Technology) -2015 Pattern

Course Code	Name of Subject/ Course	Course Outcome (COs)
314441	Theory of Computation	❑ To understand problem classification and problem solving by machines. ❑ To understand the basics of automata theory and its operations. ❑ To study computing machines by describing, classifying and comparing different types of computational models. ❑ To study computing machines by describing, classifying and comparing different types of computational models. ❑ To understand the P and NP class problems and its classification. ❑ To understand the fundamentals of problem decidability and reducibility.
314442	Database Management Systems	❑ To define basic functions of DBMS & RDBMS. ❑ To analyze database models & entity relationship models. ❑ To design and implement a database schema for a given problem-domain. ❑ To populate and query a database using SQL DML/DDL commands. ❑ Do Programming in PL/SQL including stored procedures, stored functions, cursors and packages. ❑ 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 & Project Management	❑ To identify unique features of various software application domains and classify software applications as well as to choose and apply appropriate lifecycle model of software development. ❑ To analyze software requirements by applying various modeling techniques. ❑ To understand project planning, scheduling, cost and effort estimation using various tools ❑ To describe principles of agile development, discuss the SCRUM process and distinguish agile process model from other process models. ❑ To understand IT project management through life cycle of the project and future trends in IT Project Management. ❑ To list and classify CASE tools and discuss recent trends and research in software engineering.

314444	Operating System	❑ Fundamental understanding of the role of Operating Systems ❑ To understand the concepts of a process and thread & to apply the concept of process/thread scheduling. ❑ To apply the concept of process synchronization, mutual exclusion and the deadlock. ❑ To realize the concept of I/O management and File system. ❑ To understand the various memory management techniques. ❑ To understand working of LINUX operating system.
314445	Human-Computer Interaction	❑ To explain importance of HCI study and principles of user-centered design (UCD) approach ❑ To develop understanding of human factors in HCI design ❑ To develop understanding of models, paradigms and context of interactions. ❑ To design effective user-interfaces following a structured and organized UCD process. ❑ To evaluate usability of a user-interface design. ❑ To apply cognitive models for predicting human-computer-interactions.
314446	Software Laboratory-I	❑ To install and configure database systems. ❑ To analyze database models & entity relationship models. ❑ To design and implement a database schema for a given problem-domain ❑ To understand the relational and document type database systems ❑ To populate and query a database using SQL DML/DDL commands ❑ To populate and query a database using MongoDB commands.
314447	Software Laboratory-II	❑ To understand the basics of Linux commands and program the shell of Linux & To develop various system programs for the functioning of operating system. ❑ To implement basic building blocks like processes, threads under the Linux. ❑ To develop various system programs for the functioning of OS concepts in user space like. ❑ To design and implement Linux Kernel Source Code & 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	❑ To identify the needs of users through requirement gathering ❑ To apply the concepts of Software Engineering process models for project development ❑ To apply the concepts of HCI for user-friendly project development ❑ To deploy website on live webserver and access through URL. ❑ To understand, explore and apply various web technologies ❑ To develop team building for efficient project development ❑

314450	Computer Network Technology	❑ To know Responsibilities, services offered and protocol used at each layer of network. ❑ To understand different addressing techniques used in network ❑ To know the difference between different types of network ❑ To know the different wireless technologies and IEEE standards ❑ To use and apply the standards and protocols learned, for application development ❑ To understand and explore recent trends in network domain
314451	Systems Programming	❑ To learn independently modern software development tools and creates novel solutions for language processing applications. ❑ To design and implement assemblers and macro processors. ❑ To use tool LEX for generation of Lexical Analyzer. ❑ To use YACC tool for generation of syntax analyzer. ❑ To generate output for all the phases of compiler. ❑ To apply code optimization in the compilation process.
314452	Design and Analysis of Algorithms	❑ Apply Knowledge of Mathematics to perform asymptotic analysis of algorithms. ❑ Demonstrate a familiarity with major algorithms and data structures. ❑ Apply important algorithmic design paradigms and methods of analysis. ❑ Synthesize efficient algorithms in common engineering design situations. ❑ Pointing out the importance of designing efficient algorithms by comparing different complexity classes. ❑ Introducing the concept of NP-complete problems and different techniques to deal with them.
314453	Cloud Computing	❑ To understand the need of Cloud based solutions ❑ To understand Security Mechanisms and issues in various Cloud Applications ❑ To explore effective techniques to program Cloud Systems. ❑ To understand current challenges and trade-offs in Cloud Computing ❑ To find challenges in cloud computing and delve into it to effective solutions ❑ To understand emerging trends in cloud computing
314454	Data Science & Big Data Analytics	❑ To understand Big Data primitives. ❑ To learn and apply different mathematical models for Big Data. ❑ To demonstrate their Big Data learning skills by developing industry or research applications. ❑ To analyze each learning model come from a different algorithmic approach and it will perform differently under different datasets. ❑ To understand needs challenges and techniques for big data visualization.

		❑ To learn different programming platforms for big data analytics.
314455	Software Laboratory-IV	❑ To implement small size network and its use of various networking commands ❑ To understand and use various networking and simulations tools ❑ To configure various client/server environments to use application layer protocols ❑ To understand the protocol design at various layers ❑ To explore use of protocols in various wired and wireless applications ❑ To develop applications on emerging trends
314456	Software Laboratory-V	❑ To apply algorithmic strategies for solving various problems ❑ To compare various algorithmic strategies ❑ To analyze the solution using recurrence relation ❑ To design algorithms using the dynamic programming strategy ❑ To design algorithms using the Backtracking strategy ❑ To design algorithms using the Branch and Bound strategy, and recite algorithms that employ this strategy
314457	Software Laboratory-VI	❑ To apply Big data primitives and fundamentals for application development ❑ To explore different big data processing techniques with use cases. ❑ To apply the Analytical concept of Big data using R/Python. ❑ To visualize the Big Data using Tableau. ❑ To design algorithms and techniques for big data analytics. ❑ To design Big data analytic application for emerging trends.

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Department of Information Technology

Course Outcomes (COs)

BE (Information Technology) -2015 Pattern

Course Code	Name of Subject/ Course	Course Outcome (COs)
414453	Information and Cyber Security	❑ Understand fundamental of security, various threats faced today ❑ Use basic cryptographic techniques in application development ❑ Apply methods for authentication, access control, intrusion detection and prevention ❑ To apply the scientific method to digital forensics and perform forensic investigations ❑ To develop computer forensics awareness ❑ Ability to use computer forensics tools
414454	Machine Learning and Applications	❑ Model the learning primitives and Build the learning model. ❑ Model the Classification based Learning Models ❑ Model the Regression Learning Models ❑ How Logic and Distance Based Learning Models can be used to understand Human Learning Aspects ❑ Probabilistic Approach to Learn the Human Learning Aspects ❑ 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	❑ Understand object oriented methodologies, basics of Unified Modeling Language (UML). ❑ Understand analysis process, use case modeling, domain/class modeling ❑ Understand interaction and behavior modeling. ❑ Understand design process and business, access and view layer class design ❑ Get started on study of GRASP principles and GoF design patterns. ❑ Get started on study of architectural design principles and guidelines in the various type of application development.

414456C	Usability Engineering	❑ To familiarize information, interaction and GUI design process for enhancing user-experience ❑ To explain usability engineering lifecycle for designing a user-friendly software ❑ Justify the theory and practice of usability evaluation approaches, methods and techniques ❑ Compare and evaluate strengths and weaknesses of various approaches, methods and techniques for evaluating usability. ❑ Design and implement a usability test plan, based on modeling or requirements specification ❑ Choose appropriate approaches, methods and techniques to evaluate the usability of a specified interactive system.
414456E	Business Analytics and Intelligence	❑ Comprehend the Information Systems and development approaches of Intelligent Systems ❑ Evaluate and rethink business processes using information systems ❑ Propose the Framework for business intelligence ❑ Get acquainted with the Theories, techniques, and considerations for capturing. ❑ Align business intelligence with business strategy ❑ Apply the techniques for implementing business intelligence systems
414457C	Software Testing and Quality Assurance	❑ Test the software by applying testing techniques to deliver a product free from bugs ❑ Investigate the scenario and to select the proper testing technique ❑ Explore the test automation concepts and tools and estimation of cost, schedule based on standard metrics. ❑ Understand how to detect, classify, prevent and remove defects. ❑ Choose appropriate quality assurance models and develop quality. ❑ Ability to conduct formal inspections, record and evaluate results of inspections.
414459	Computer Laboratory-VIII	❑ Draw, discuss different UML 2.0 diagrams, their concepts, notation, advanced notation, forward and reverse engineering aspects. ❑ Identify different software artifacts used to develop use case model from requirements. ❑ Identify different software artifacts used to develop and implement Interaction and behavior Model from requirements. ❑ Identify different software artifacts used to develop and implement analysis model and design model from requirements. ❑ Implement an appropriate design pattern to solve a design problem.
414458	Computer Laboratory-VII	❑ The Students will be able to understand and select appropriate Software tools to implement Complex Machine Learning Problems ❑ The students will be able to implement Naïve Bayes

		Algorithm to Different Machine Learning Problems ❑ The Students will be able to implement and apply Regression techniques various analytical problems ❑ the Students will be able to understand necessity of dimensionality reduction in machine learning tasks ❑ the students will be able to understand how SVM is used to solve classification task ❑ The students will be able to learn and implement kmeans algorithm and clustering using kmeans
414462	Distributed Computing System	❑ Understand the principles and desired properties of distributed systems based on different application areas. ❑ Understand and apply the basic theoretical concepts and algorithms of distributed systems in problem solving ❑ Recognize the inherent difficulties that arise due to distributed-ness of computing resources ❑ Identify the challenges in developing distributed applications
414463	Ubiquitous Computing	❑ Demonstrate the knowledge of design of Ubicomp and its applications. ❑ Explain smart devices and services used Ubicomp. ❑ Describe the significance of actuators and controllers in real time application design. ❑ Use the concept of HCI to understand the design of automation applications. ❑ Classify Ubicomp privacy and explain the challenges associated with Ubicomp privacy. ❑ Get the knowledge of ubiquitous and service oriented networks along with Ubicomp management
414464B	Information Storage and Retrieval	❑ Student should be able to understand the concept of Information retrieval. ❑ Student should be able to deal with storage and retrieval process of text and multimedia data. ❑ Student should be able to evaluate performance of any information retrieval system. ❑ Students should be able to design user interfaces. ❑ Student should be able to understand importance of recommender system. ❑ Student should be able to understand concept of multimedia and distributed information retrieval
414465	Social Media Analytics	❑ Understand the basics of Social Media Analytics ❑ Explain the significance of Data mining in Social media ❑ Demonstrate the algorithms used for text mining ❑ Apply network measures for social media data ❑ Explain Behavior Analytics techniques used for social media data. ❑ Apply social media analytics for Face book and Twitter kind of applications

414466	Computer laboratory-IX	❑ Demonstrate knowledge of the core concepts and techniques in distributed systems. ❑ Learn how to apply principles of state-of-the-Art Distributed systems in practical application. ❑ Design, build and test application programs on distributed systems
414467	Computer laboratory-X	❑ set up the Android environment and explain the Evolution of cellular networks (BT-2) ❑ develop the User Interfaces using pre-built Android UI components (BT -6) ❑ create applications for performing CURD SQLite database operations using Android(BT-6) ❑ create the smart android applications using the data captured through sensors (BT-6) ❑ implement the authentication protocols between two mobile devices for providing security (BT-3) ❑ analyze the data collected through android sensors using any machine learning algorithm (BT-4).

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Department of Computer Engineering

Course Outcomes (COs)

SE (Computer Engineering) -2015 Pattern

Course Code	Name of Subject/ Course	Course Outcome (COs)
210241	Discrete Mathematics	❑ Student will able to solve real world problems logically using appropriate set, function, and relation, relation models. ❑ Student will able to interpret the associated operations and terminologies in context. ❑ Student will able to analyze the real world problems using discrete mathematics. ❑ Student will able to synthesize the real world problems using discrete mathematics. ❑ Student will able to formulate problems precisely using discrete mathematics. ❑ Student will able to apply formal proof techniques and explain the reasoning.
210242	Digital Electronics & Logic Design	❑ 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 select the logic families IC packages as per the design specifications. ❑ Design the minimum systems using VHDL. ❑ Develop minimum embedded system for simple real world application. ❑ To develop skill to build and troubleshoot digital circuit
210243	Data Structures & Algorithms	❑ To Explain the basic concepts like Algorithms, Algorithmic Strategies and Data Structures ❑ To illustrate Data Structures Using Sequential Organization ❑ To Describe Linear Data Structures Using Linked Organization ❑ To Express Stack as LIFO data structure ❑ To Express Queue as FIFO data structure
210244	Computer Organization & Architecture	❑ To understand the structure, function and characteristics of computer systems. ❑ To understand the design of the various functional units

		and components of digital computers. ❑ To identify the elements of modern instructions sets and explain their impact on processor design. ❑ To explain the function of each element of a memory hierarchy, identify and compare different methods for computer I/O. ❑ To compare simple computer architectures and organizations based on established performance metrics. ❑ To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point arithmetic.
210245	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 ❑ To implement File handling using object-oriented programming. ❑ Able to analyse, design and construct sophisticated software applications to industry standards
210246	Digital Electronics lab	❑ Apply knowledge and concepts and methods of digital system design techniques ❑ Use logic function representation for simplification with K-Maps and analyze as well as design Combinational logic circuits using SSI & MSI chips. ❑ Analyze Sequential circuits like Flip-Flops (Truth Table, Excitation table) & design the applications like Asynchronous and Synchronous Counters ❑ Design Sequential Logic circuits: Sequence generators, MOD counters with registers/Counters using synchronous /asynchronous counters ❑ Understand the need of skills, techniques and learn state-of-the-art engineering tools through hands-on experimentation on the Xilinx tools for design as well as the basics of VHDL. ❑ Understand and implement the design Steps, main programming technique with different modeling styles for any digital circuits with VHDL Programming
210247	Data Structures Lab	❑ To explain Linear Data Structures. ❑ To apply stack to the given application. ❑ To apply queue to the given application. ❑ To compute various sorting algorithms.
210248	Object oriented Programming Lab	❑ Able to know basic architecture, memory system of 64 bit Linux operating system ❑ Implement and analysis the concept of function and polymorphism by using C++ programming I ❑ Implement the concept of exception and file handling

		❑ Implement the various data structure using C++ programming ❑ Design and implement the application software using C++.
210249	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, interpersonal relationships, conflict management and leadership quality.
SEM-II		
207003	Engineering Mathematics-3	❑ Student will able to solve higher order linear differential equations to understand appropriate techniques of modeling and analyzing electrical circuits. ❑ Student will able to solve problems related to Fourier transform, Z-transform and applications to signal and image processing. ❑ Student will able to apply statistical methods like correlation and regression analysis, Measures of central tendency and its applications.. ❑ Student will able to understand probability theory and its applications. Probability distributions. Analysis and prediction of data as applied to machine intelligence. ❑ Student will able to perform vector differentiation and integration to analyze the vector fields and apply to compute line, surface and volume integrals. ❑ Student will able to analyze conformal mappings, transformations and perform contour integration of complex functions required in image processing, digital filters and computer graphics.
210251	Computer Graphics	❑ Introduce and give exposure to fundamental of computer graphics and various Applications in computer graphics. ❑ To understand scan conversion of line, Circle, and ellipse. ❑ To understand polygon clipping and windowing clipping. ❑ To understand 2-D and 3-D transformation. ❑ To provide basis modeling of object with curves, fractals and hidden Surfaces ❑ To understand segments, Animation, gaming platforms with interactive graphics usage tools
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	❑ Apply the assembly language programming to develop small real life embedded application. ❑ Understand the architecture of the advanced processor thoroughly to use the resources for programming ❑ Understand the higher processor architectures descended from 80386 architecture ❑ Understand debugging and testing techniques ❑ Understand processor's various modes of operation and mode switching ❑ Understand Numeric data processor and its working with main processor
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 use the programming paradigms effectively in application development. ❑ To understand the fundamentals of Java ❑ To understand the Web development features of Java
210255	Computer Graphics lab	❑ Understand the basic concepts of computer graphics. ❑ Design scan conversion problems using C++ programming. ❑ Apply clipping and filling techniques for modifying an object. ❑ Understand the concepts of different type of geometric transformation of objects in 2D and 3D. ❑ Understand the practical implementation of modeling, rendering, viewing of objects in 2D &3D. ❑ Understanding different fractal structures and implementation of Koch & Hilbert curves and animation sequences.
210256	Advanced Data Structures Lab	❑ 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.
210257	Microprocessor Lab	❑ To perform various numerical computations using assembly language programming. ❑ To explain various types of 80386 modes and switching among them. ❑ To Describe the recursion technique in assembly language programming ❑ To Understand implementation of various DOS Commands. ❑ To Understand Numeric data processor and its working with main processor. ❑ To Analyse the Terminate but Stay Resident (TSR) program.

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Course Code	Name of Subject/ Course	Course Outcome (COs)
310241	Theory of Computation	❑ Design DFA, NFA & e-NFA for the given problem ❑ Convert RE to Automata & vice-versa ❑ Design grammar for context free and regular languages. ❑ Design Pushdown Automata for context free language. ❑ Design deterministic or non deterministic Turing machine for all input all output , NP Complete or NP Hard ❑ Identify the decidability of the problem statement.
310242	Database Managements System	❑ Design E-R Model for given requirements and convert the same into database tables. ❑ Use database techniques such as SQL & PL/SQL ❑ Design relational databases for real life problems using conceptual or logical design processes ❑ Explain transaction Management in relational database System. ❑ Describe different database architecture and analyze the use of appropriate architecture in real time environment ❑ Use modern database techniques and advanced database Programming concepts such as NOSQL and Big Data
310243	Software Engineering & Project Management	❑ Decide on a process model for a developing a software project ❑ Classify software applications and Identify unique features of various domains ❑ Design test cases of a software system ❑ Understand basics of IT Project management ❑ Plan, schedule and execute a project considering the risk management ❑ Apply quality attributes in software development life cycle
310244	Information Systems & Engineering Economics	❑ Understand the need, usage and importance of an Information System to an organization. ❑ Perform and evaluate present worth, future worth and annual worth analysis on one or more economic alternatives. ❑ Understand the activities that are undertaken while managing, designing, planning, implementation, and

		deployment of computerized information system in an organization. ❑ Student would be aware of various Information System solutions like ERP, CRM, Data warehouses and the issues in successful implementation of these technology solutions in any organizations. ❑ Outline the past history, present position and expected performance of a company engaged in engineering practice or in the computer industry. ❑ Be able to carry out and evaluate benefit/cost, life cycle and breakeven analysis on one or more economic alternatives.
310245	Computer Networks	❑ Learn to use Network Related commands and configuration files in Linux Operating System. ❑ Learn to Develop Network Application Programs. ❑ Analyze Network Traffic using network Monitoring Tools ❑ Illustrate client-server architectures and protocols by the means of correct standards and technology. ❑ Demonstrate different routing and switching algorithms and simulation programming.
310246	Skill Development Lab	❑ Evaluate problems and analyze data using current technologies in a wide variety of business and organizational contexts. ❑ Create data-driven web applications ❑ Incorporate best practices for building applications. ❑ Employ Integrated Development Environment(IDE) for implementing and testing of software solution ❑ Construct software solutions by evaluating alternate architectural patterns. ❑ Understand and to use data advanced analytic tools
310247	DBMS Lab	❑ Understand working of MySQL relational database and handle SQL objects such as Table, View, Index, Sequence, Synonym ❑ Populate and query relational databases using SQL DML statements for various database applications ❑ Use PL/SQL Programming concepts such as Cursors, Control structure and Exception handling Stored Procedures and Triggers for various database applications ❑ Understand working of MongoDB - NoSQL database and design basic MongoDB queries, Aggregation, Indexing & Map Reduce operations ❑ Design and develop Database navigation operations using various databases with front end technologies
310248	CN Lab	❑ Analyze the requirements for a given organizational structure to select the most appropriate networking architectures, topologies, transmission medium and technologies. ❑ Demonstrate design issues, flow control and error control. ❑ Analyze data flow between TCP/IP model using Application, Transport and Network layer protocols.

		❑ Illustrate applications of Computer Network capabilities, selection and usage for various sectors of user community. ❑ Illustrate client-server architectures and protocols by the means of correct standards and technology. ❑ Demonstrate different routing and switching algorithms.
SEM-II		
310250	Design & Analysis of Algorithm	❑ To survey algorithmic strategies give presentation using open source documentation tools like Latex and soft skill methodologies ❑ To write mathematical modeling of algorithms for problem solving ❑ To solve problems for multi core or distributed or concurrent/parallel/embedded environments. ❑ To solve real world problems by using optimization algorithms. ❑ To apply the mathematical modeling, adaptive, dynamic and numerical analysis in IOT
310251	Systems Programming & Operating Systems	❑ Analyze and synthesize role played various system software ❑ Apply techniques to develop macros, loaders and linkers ❑ To use tools like LEX & YACC for designing a compiler for an elementary language grammar ❑ To understand and analyze process management in operating systems including scheduling & deadlocks. ❑ To understand various memory-management techniques, including paging and segmentation. ❑ To discuss file system design including access methods, file sharing, locking and directory structure.
310252	Embedded Systems & IoT	❑ Implement an architectural design for IoT for specified requirement ❑ Solve the given societal challenge using IoT ❑ Choose between available technologies and devices for stated IoT challenge ❑ learn the Key features required for IoT security ❑ Understand the Architecture of WoT and its specification ❑ Understand the architecture of Cloud of Things
310253	Software Modeling & Design	❑ Analyze the problem statement (SRS) and choose proper design technique for designing web-based/ desktop application ❑ Design and analyze an application using UML modeling as fundamental tool ❑ Apply design patterns to understand reusability in OO design ❑ Decide and apply appropriate modern tool for designing and modeling ❑ Decide and apply appropriate modern testing tool for testing web-based/desktop application
310254	Web Technologies	❑ Analyze given assignment to select sustainable web development and design methodology.

		❑ Develop and deploy web based application using suitable client side web technologies. ❑ Develop and deploy web based application using suitable server side web technologies. ❑ Develop web based application using suitable client and server side web technologies with form and database handling. ❑ Design and deploy the emerging client and server side frameworks. ❑ Develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management.
310255	Seminar & Technical Communication	On completion of the course, student will– ❑ Be able to be familiar with basic technical writing concepts and terms, such as audience analysis, jargon, format, visuals, and presentation. ❑ Be able to improve skills to read, understand, and interpret material on technology. ❑ improve communication and writing skills
310256	WT Lab	❑ Installation, configuration of Web Servers and Developing Web Page using HTML, CSS and XML. ❑ To Study validation of web page Contents ❑ To study Dynamic Web Page Creation using Servlet and JSP ❑ To study Dynamic Web Page Creation using PHP, Mysql and AJAX ❑ Develop solution to complex problems using appropriate method, technologies, frameworks ❑ Develop web based application using suitable client side and server side web technologies web services and content management
310257	SP&OS Lab	❑ Design and evaluate assembler Pass-I & Pass-II ❑ Design and evaluate macro Pass-I & Pass-II ❑ Create lexical analyzer using lex tool ❑ Create syntax analyzer using YAAC tool ❑ Create and use dynamic link libraries ❑ Understand and implement process scheduling mechanisms ❑ Understand and implement memory management functionalities in operating system
310258	ES & IoT Lab	❑ To understand functionalities of various single board embedded platforms fundamentals ❑ To develop comprehensive approach towards building small low cost embedded IoT system ❑ To understand different sensory inputs ❑ To develop remote controlled smart system ❑ To understand the process to store sensor data on cloud ❑ To develop smart surveillance system

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Department of Computer Engineering

Course Outcomes (COs)

BE (Computer Engineering) -2015 Pattern

Course Code	Name of Subject/ Course	Course Outcome (COs)
410241	High Performance Computing	❑ Describe different parallel architectures, interconnect networks, programming models ❑ Develop an efficient parallel algorithm to solve given problem ❑ Analyze and measure performance of modern parallel computing systems ❑ Build the logic to parallelize the programming task ❑ An ability to apply design and development principles of parallelization in the construction of software systems of varying complexity. ❑ Understand the CUDA programming models and Parallelize sequential tasks.
410242	Artificial Intelligence and Robotics	On completion of the course, student will be able to– ❑ Identify and apply suitable Intelligent agents for various AI applications ❑ Design smart system using different informed search / uninformed search or heuristic approaches. ❑ Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem. ❑ Apply the suitable algorithms to solve AI problems.
410243	Data Analytics	On completion of the course, student will be able to– ❑ Write case studies in Business Analytic and Intelligence using mathematical models ❑ Present a survey on applications for Business Analytic and Intelligence ❑ Provide problem solutions for multi-core or distributed, concurrent/Parallel environments
410244(D)	Ele-1:Data Mining and Warehousing	On completion of the course the student should be able to- ❑ Apply basic, intermediate and advanced techniques to mine the data ❑ Analyze the output generated by the process of data mining ❑ Explore the hidden patterns in the data ❑ Optimize the mining process by choosing best data mining

		technique
410245(B)	Ele-2:Software Testing and Quality Assurance	On completion of the course, student will be able to– ❑ Describe fundamental concepts in software testing such as manual testing, automation testing and software quality assurance. ❑ Design and develop project test plan, design test cases, test data, and conduct test operations ❑ Apply recent automation tool for various software testing for testing software ❑ Apply different approaches of quality management, assurance, and quality standard to software system ❑ Apply and analyze effectiveness Software Quality Tools
410245(A)	Distributed Systems	On completion of the course, student will be able to– ❑ Able to learn and apply the concept of remote method invocation and Remote Procedure Calls ❑ Able to analyze the mechanism of peer to peer systems and Distributed File Systems ❑ Demonstrate an understanding of the challenges faced by current and future distributed systems
410246	Laboratory Practice I	❑ Build the logic to parallelize the programming task ❑ Analyze and measure performance of modern parallel computing systems ❑ Identify and apply suitable Intelligent agents for various AI applications ❑ "Design smart system using different informed search / uninformed search or heuristic approaches" ❑ Understand the statistics and Mathematics use to solve big data analytics problem. ❑ Understand the impact of big data for business decisions and strategy
410247	Laboratory Practice II	❑ Able to learn and apply the concept of remote method invocation and Remote Procedure Calls. ❑ Learn and apply the concept of Inter-process Communication. ❑ Analyze the different distributed algorithm. ❑ Analyze the mechanism of peer to peer systems and Distributed File Systems. ❑ Learn and apply the concept of Time, Global state and coordination. ❑ Demonstrate an understanding of the challenges faced by current and future distributed systems. ❑ Implement the mini projects based on software testing framework.
SEM-II		
410250	Machine Learning	On completion of the course, student will be able to– ❑ Distinguish different learning based applications ❑ Apply different preprocessing methods to prepare training data set for machine learning.

		❑ Design and implement supervised and unsupervised machine learning algorithm. ❑ Implement different learning models ❑ Learn Meta classifiers and deep learning concepts
410251	Information and Cyber Security	On completion of the course, student will be able to– ❑ Gauge the security protections and limitations provided by today's technology. ❑ Identify information security and cyber security threats. ❑ Analyze threats in order to protect or defend it in cyberspace from cyber-attacks. ❑ Build appropriate security solutions against cyber-attacks.

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Department of Electronics and Telecommunication

Course Outcomes (COs)

SE (Electronics and Telecommunication) -2015 Pattern

Course Code	Name of Subject/ Course	Course Outcome (COs)
204181	Signals and Systems	❑ Understand mathematical description and representation of continuous and discrete time signals and systems. ❑ Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system ❑ Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms ❑ Understand the limitations of Fourier transform and need for Laplace transform and develop the ability to analyze the system in s- domain. ❑ Understand the basic concept of probability, random variables & random signals and develop the ability to find correlation, CDF, PDF and probability of a given event.
204182	Electronic Devices and Circuits	❑ Comply and verify parameters after exciting devices by any stated method. ❑ Implement circuit and test the performance. ❑ Analyze small signal model of FET and MOSFET. ❑ Explain behavior of FET at low frequency. ❑ Design an adjustable voltage regulator circuits.
204183	Electrical Circuits and Machines	❑ Analyze basic AC & DC circuit for voltage, current and power by using KVL, KCL, andnetwork theorems. ❑ Explain the working principle of different electrical machines. ❑ Select proper electrical motor for given application. ❑ Design and analyze transformers.
204184	Data Structures and Algorithms	❑ Write and understand the programs that use arrays & pointers in C. ❑ Discuss the computational efficiency of the principal algorithms such as sorting & searching. ❑ Implement stacks & queues for various applications. ❑ Describe how arrays, records, linked structures are represented in memory and use them in algorithms. ❑ Understand various terminologies and traversals of trees and use them for various applications. ❑ Understand various terminologies and traversals of graphs and use them for various applications.
204185	Digital Electronics	❑ Use the basic logic gates and various reduction techniques of digital logic circuit in detail.

		❑ Design combinational and sequential circuits. ❑ Design and implement hardware circuit to test performance and application. ❑ Understand the architecture and use of microcontrollers for basic operations and Simulate using simulation software.
204186	Electronic Measuring Instruments and Tools	❑ Understand fundamental of various electrical measurements. ❑ Understand and describe specifications, features and capabilities of electronic instruments. ❑ Finalize the specifications of instrument and select an appropriate instrument for given measurement ❑ Carry out required measurement using various instruments under different setups. ❑ Able to compare measuring instruments for performance parameters. ❑ Select appropriate instrument for the measurement of electrical parameter professionally.
207005	Engineering Mathematics II	❑ Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits. ❑ Solve problems related to Fourier transform, Z-transform and applications to Communication systems and Signal processing. ❑ Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing. ❑ Perform vector differentiation and analyze the vector fields. ❑ Perform vector differentiation and integration, analyze the vector fields and apply to Electro-Magnetic fields. ❑ Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing.
204187	Integrated Circuits	❑ To understand characteristics of IC and Op-Amp and identify the internal structure. ❑ To introduce various manufacturing techniques. ❑ To study various op-amp parameters and their significance for Op-Amp. ❑ To learn frequency response, transient response and frequency compensation techniques for Op-Amp. ❑ To analyze and identify linear and nonlinear applications of Op-Amp. ❑ To understand functionalities of PLL and its use in various applications in communication and control systems
204188	Control System	❑ Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems. ❑ Determine (Absolute) stability of a closed loop control system. ❑ Perform time domain and frequency domain analysis of control systems required for stability analysis. ❑ Perform time domain and frequency domain correlation analysis ❑ Apply root locus, frequency plot technique to analyze control

		system**.**
204189	Analog Communication	❑ Understand and identify the fundamental concepts and various components of analog communication systems. ❑ Understand, analyze and explain various analog modulation demodulation schemes. ❑ Understand the performance of analog communications systems under the presence of noise. ❑ Develop the ability to compare and contrast the strengths and weaknesses of various communication systems. ❑ Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system. ❑ Describe analog pulse modulation techniques and digital modulation technique.
204190	Object Oriented Programming	❑ Describe the principles of object oriented programming. ❑ Apply the concepts of data encapsulation, inheritance in C++. ❑ Understand basic program constructs in Java ❑ Apply the concepts of classes, methods and inheritance to write programs Java ❑ Use arrays, vectors and strings concepts and interfaces to write programs in Java. ❑ Describe and use the concepts in Java to develop user friendly program.
204191	Employability Skill Development	❑ Have skills and preparedness for aptitude tests. ❑ Be equipped with essential communication skills (writing, verbal and non-verbal) ❑ Master the presentation skill and be ready for facing interviews. ❑ Build team and lead it for problem solving.

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Course Outcomes (COs)

TE (Electronics and Telecommunication) -2015 Pattern

Course Code	Name of Subject/ Course	Course Outcome (COs)
304181	Digital Communication	❑ Understand working of waveform coding techniques and analyse their performance. ❑ Analyse the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency. ❑ Understand the effect of random signal & noise on digital signals. ❑ Perform the time and frequency domain analysis of the signals in a digital communication system ❑ Design of digital communication system. ❑ Understand working of spread spectrum communication system and analyse its performance.
304182	Digital Signal Processing	❑ Analyze the discrete time signals and system using different transform domain techniques. ❑ Design and implement LTI filters for filtering different real world signals. ❑ Develop different signal processing applications using DSP processor. ❑ Capable of calibrating and resolving different frequencies existing in any signal.
304183	Electromagnetics	❑ To introduce the basic mathematical concepts related to electromagnetic vector fields. ❑ To impart knowledge on the concepts of electrostatics, electric potential, energy density and their applications. ❑ To impart knowledge on the concepts of magnetostatics, magnetic flux density, scalar and vector potential and its applications. ❑ To impart knowledge on the concepts of Faraday's law, induced emf and Maxwell's equations ❑ To impart knowledge on the concepts of Concepts of electromagnetic waves and Transmission lines
304184	Microcontrollers	❑ Learn importance of microcontroller in designing embedded application ❑ Learn use of hardware and software tools. ❑ Develop interfacing to real world devices. ❑ Learn programming language for real world devices

		❑ Interface different peripherals with 8051 & PIC microcontroller ❑ Implement embedded systems for communication of peripherals with microcontroller
304185	Mechatronics	❑ Identification of key elements of mechatronics system and its representation in terms of block diagram. ❑ Understanding basic principal of Sensors and Transducer. ❑ Understanding various Hydraulic Systems. ❑ Understanding various Pneumatic Systems. ❑ Understanding concept of actuator. ❑ Able to prepare case study of the system given.
304191	Signal Processing and Communications Lab	❑ Understand working of waveform coding techniques and analyse their performance. ❑ Understand time and frequency domain analysis of line codes. ❑ Acquired knowledge about different M-ary modulation techniques. ❑ Understand the effect of random signal & noise on digital signals. ❑ Understand working of spread spectrum communication system and analyse its performance. ❑ Analyze the discrete time signals and system using different transform domain techniques & their properties. . ❑ Design and implement LTI filters for filtering different real world signals. ❑ Develop different signal processing applications using DSP processor. ❑ Analyse effect of different windowing function on filter response. ❑ Analyze effect of different sampling frequencies.
304192	Microcontrollers and Mechatronics Lab	❑ Learn to program microcontroller using assembly language ❑ Learn to program microcontroller using embedded c language ❑ Learn to use different hardware and software tools to be used for different microcontroller ❑ Implement embedded systems for communication of peripherals with microcontroller ❑ Interface different peripherals with 8051 & PIC microcontroller ❑ Learn to implement real world embedded system application ❑ Learn to programme microcontroller using assembly language and embedded c language. ❑ Learn to use different hardware and software tools to be used for different microcontroller. ❑ Interface different peripherals with 8051 & PIC microcontroller. ❑ To develop a simulation model for simple physical systems and explain mechatronics design process. ❑ To design and implement data acquisition system. ❑ To design and implement various case studies of Mechatronics systems.
304193	Electronics System Design	❑ Design switch mode power supply by applying the fundamental concepts, working principles of electronics devices, selecting appropriate components and devices by interpreting datasheets and validate its performance by simulating the same using EDA tool.

		❑ Design prototype of Data Acquisition system. by applying the fundamental concepts, working principles of electronics devices, selection of appropriate components and devices, transducer and signal conditioning circuit by interpreting datasheets. ❑ Create, manage the database and query handling using suitable tools. ❑ Design prototype of communication block by applying the fundamental concepts, working principles of electronics devices, select appropriate components and devices by interpreting datasheets. ❑ Shall be able to use PCB Design tool for schemetic and layout design.
304186	Power Electronics	❑ Design & implement a triggering / gate drive circuit for a power device. ❑ Understand, perform & analyze different AC-DC power converters. ❑ Understand, perform & analyze different DC-AC converters. ❑ Understand, perform & analyze different DC-DC converters. ❑ Evaluate battery backup time & design a battery charger. ❑ Design & implement over voltage / over current protection circuit.
304187	Information Theory Coding and Communication Networks	❑ Perform information theoretic analysis of communication system. ❑ Design a data compression scheme using suitable source coding technique. ❑ Design a channel coding scheme for a communication system. ❑ Understand and apply fundamental principles of data communication and networking. ❑ Apply flow and error control techniques in communication networks. ❑ Select an appropriate error correcting codes for a particular application.
304188	Business Management	❑ Get overview of Management Science aspects useful in business. ❑ Overview of marketing & importance of social media in marketing ❑ Understand the crypto currency concept ❑ Get overview of Management Science aspects useful in business. ❑ Get motivation for Entrepreneurship ❑ Get Quality Aspects for Systematically Running
304189	Advanced Processors	❑ Describe the ARM microprocessor architectures and its feature ❑ Interface the advanced peripherals to ARM based microcontroller ❑ Design embedded system with available resources ❑ Use of DSP Processors and resources for signal processing applications

		❑ To program peripherals to arm microcontroller ❑ Learn advance tool to program ARM microcontroller
304190	System Programming and Operating Systems	❑ Demonstrate the knowledge of Systems Programming and Operating Systems. ❑ Formulate the Problem and develop the solution for same. ❑ Compare and analyze the different implementation approach of system programming operating system abstractions. ❑ Interpret various OS functions used in Linux / Ubuntu
304194	Power and ITCT Lab	❑ Design & implement a triggering / gate drive circuit for a power device. ❑ Understand, perform & analyze different power converters. ❑ Design & implement over voltage / over current protection circuit. ❑ Design a data compression scheme using suitable source coding technique. ❑ Design a channel coding scheme for a communication system. ❑ Understand and apply fundamental principles of data communication and networking. ❑ Implement information theoretic analysis using different information Measures. ❑ Implement different source coding techniques. ❑ Implement Encoding & decoding techniques for various codes. ❑ Understand how to transmit and receive text data with coding techniques. ❑ Understand and apply various Data compression techniques. ❑ Apply concepts to implement networking protocols.
304195	Advanced Processors and System Programming Lab	❑ Programming ARM7 based microcontroller ❑ Learn & understand UART communication ❑ Learn the concept of interrupt ❑ Learn communication protocol ❑ Programming DSP based microcontroller ❑ Understand the need of DSP processor ❑ To understand system software concepts, like the use and implementation of assembler, macros, linker, loader and compiler. ❑ To understand the concept of lexical analyzer and implement it. ❑ To explore memory allocation methods, input output devices and file system w.r.t various operating system. ❑ To understand the Deadlock, Deadlock avoidance, Deadlock Detection algorithms ❑ To study and Implement various processes, scheduling techniques schemes in operating system ❑ Interpret various OS functions used in Linux/Ubuntu and study its system calls.
304196	Employability Skills and Mini Project	❑ To understand the ―Product Development Process‟ including budgeting through Mini Project.

		❑ To plan for various activities of the project and distribute the work amongst team members. ❑ To inculcate electronic hardware implementation skills by - Learning PCB artwork design using an appropriate EDA tool. ❑ Imbibing good soldering and effective trouble-shooting practices. ❑ Following correct grounding and shielding practices. ❑ To develop student‘s abilities to transmit technical information clearly and test the same by delivery of Seminar based on the Mini Project. ❑ To understand the importance of document design by compiling Technical Report on the Mini Project work carried out.

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Department of Electronics and Telecommunication

Course Outcomes (COs)

BE (Electronics and Telecommunication) -2015 Pattern

Course Code	Name of Subject/ Course	Course Outcome (COs)
404181	VLSI Design and Technology	❑ Write effective HDL coding for digital design. ❑ Apply knowledge of real time issues in digital design. ❑ Model digital circuit with HDL, simulate, synthesis and prototype in PLDs. ❑ Design CMOS circuits for specified applications. ❑ Analyze various issues and constraints in design of an ASIC ❑ Apply knowledge of testability in design and build self test circuit.
404182	Computer Networks and Security	❑ Understand fundamental underlying principles of computer networking ❑ Describe and analyze the hardware, software, components of a network and their interrelations. ❑ Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies ❑ Have a basic knowledge of installing and configuring networking applications. ❑ Specify and identify deficiencies in existing protocols, and then go onto select new and better protocols. ❑ Have a basic knowledge of the use of cryptography and network security.
404183	Radiation and Microwave Techniques	❑ Differentiate various performance parameters of radiating elements. ❑ Analyze various radiating elements and arrays ❑ Apply the knowledge of waveguide fundamentals in design of transmission lines. ❑ Design and set up a system consisting of various passive microwave components. ❑ Analyze tube based and solid state active devices along with their applications. ❑ Measure various performance parameters of microwave components
404184A	EL-I Digital Image and Video Processing	❑ Develop and implement basic mathematical operations on digital images. ❑ Analyse and solve image enhancement and image restoration problems.

		❑ Identify and design image processing techniques for object segmentation and recognition. ❑ Represent objects and region of the image with appropriate method. ❑ Apply 2-D data compression techniques for digital images. ❑ Explore video signal representation and different algorithm for video processing.
404184B	EL-I Industrial Drives and Controls	❑ Understand the basic principles of power electronics in drives and its control, types of drives and basic requirements placed by mechanical systems on electric drives for various applications ❑ Understand the operation of 1ϕ & 3ϕ converter drives for separately excited & series DC motors, dual converter drives, 2 quadrant and 4 quadrant DC chopper drives, Open-loop & closed-loop control of DC drives with transfer function, Dynamic and regenerative braking. Protection circuits for DC drives. ❑ Learn speed control of induction motor drives in an energy efficient manner using power electronics. To study and understand the operation of both classical and modern induction motor drives like FOC or Vector control. ❑ Learn and understand working of various types of synchronous motors and their drive systems ❑ Learn stepper motors & drives, BLDC and SRM motors and drives ❑ Understand modern control techniques of Fuzzy logic and ANN in motor drive application
404184C	EL-I Embedded System and RTOS	❑ Understand design of embedded system ❑ Use RTOS in embedded application ❑ Use modern architecture for embedded system ❑ Use Linux for embedded system development ❑ Use open platform for embedded system development
404184D	EL-I Internet of Things	❑ Understand the various concepts and terminologies and architecture of IoT systems. ❑ Use sensors and actuators for design of IoT. ❑ Understand wireless technologies for design of IoT systems. ❑ Understand and apply various protocols for design of IoT systems. ❑ Use various techniques of data storage and analytics in IoT. ❑ Understand various applications of IoT.
404185A	EL-II Wavelets	❑ On completion of the course, student will be able to ❑ Explore and learn the basics of linear algebra. ❑ Identify the need of Wavelet transform and its properties. ❑ Analyze the 1-D and 2-D signal using discrete wavelet transform. ❑ Analyze the signal using Multi resolution analysis ❑ Use wavelet transform in different applications like data compression, denoising, enhancement etc.
404185B	EL-II Electronics Product Design	❑ Understand various stages of hardware, software and PCBdesign.

		❑ Importance of product test &testspecifications. ❑ Special design considerations and importance ofdocumentation
404185C	EL-II Optimization Techniques	❑ Describe clearly a problem, identify its parts and analyze the individual functions. ❑ Perform mathematical translation of the verbal formulation of an optimizationproblem. ❑ Design algorithms, the repetitive use of which will lead reliably to finding an approximate solution ❑ Discover study and solve optimization problems. ❑ Investigate study, develop, organize and promote innovative solutions for various applications.
404185D	EL-II Artificial Intelligence	❑ Design and implement key components of intelligent agents and expert systems. ❑ To apply knowledge representation techniques and problem solving strategies to common AI applications. ❑ Apply and integrate various artificial intelligence techniques in intelligent system development as well as understand the importance of maintaining intelligent systems. ❑ Build rule-based and other knowledge-intensive problem solvers. ❑ To apply an understanding of pattern recognition in application & apply them ❑ To be able to analyze natural language
404185E	EL-II Electronics in Agriculture	❑ Understand Role of computers & virtual instrumentation. ❑ Provide communication solution for interpreting environmental parameters with Electronics systems. ❑ Describe Instrument technology used in agriculture. ❑ Apply knowledge of Electronics in Agriculture. ❑ Understand Greenhouse Technology & Role of Electronics Governance.
404186	Lab Practice I (CNS+RMT)	❑ Understand fundamental underlying principles of computer networking ❑ Describe and analyze the hardware, software, components of a network and their interrelations. ❑ Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies ❑ Have a basic knowledge of installing and configuring networking applications. ❑ To introduce fundamental theory of radiation and microwaves. ❑ To understand design principles of various radiating elements. ❑ To understand theory of passive and active components of microwave systems ❑ To learn microwave measurement techniques
404187	Lab Practice II (VLSI D&T + Elective I)	❑ Write effective HDL coding for digital design. ❑ Model digital circuit with HDL, simulate, synthesis and prototype in PLDs. ❑ Design CMOS circuits for specified applications.

		❑ Apply knowledge of testability in design and build self test circuit. ❑ Develop and implement basic mathematical operations on digital images. ❑ Analyze and solve image enhancement and image restoration problems. ❑ Identify and design image processing techniques for object segmentation and recognition. ❑ Represent objects and region of the image with appropriate method. ❑ Explore video signal representation and different algorithm for video processing ❑ Use sensors, actuators and wireless technologies for design of IoT. ❑ Understand and apply various protocols for design of IoT systems. ❑ Use various techniques of data storage and analytics in IoT.
404189	Mobile Communication	❑ Apply the concepts of switching technique and traffic engineering to design multistage networks. ❑ Explore the architecture of GSM. ❑ Differentiate thoroughly the generations of mobile technologies
404190	Broadband Communication Systems	❑ Perform Link power budget and Rise Time Budget by proper selection of components and check its viability. ❑ Perform Satellite Link design for Up Link and Down Link
404191A	Machine Learning	❑ To compare and contrast pros and cons of various machine learning techniques and to get an in sight of when to apply a particular machine learning approach. ❑ To mathematically analyze various machine learning approaches and paradigms. ❑ To implement convolution neural networks in recognition applications
404191B	PLCs and Automation	❑ Understand PLC architecture ❑ Develop PLC ladder programs for simple industrial applications ❑ Design Automation systems for industrial applications ❑ Implement the Engineering Automation using PLC approach
404191C	Audio and Speech Processing	❑ Design and implement algorithms for processing speech and audio signals considering the properties of acoustic signals and human hearing. ❑ Analyze speech signal to extract the characteristic of vocal tract (formants) and vocal cords (pitch). ❑ Analyze speech signal for extracting LPC and MFCC Parameters of speech signal. ❑ Apply the knowledge of speech and audio signal analysis to build speech processing applications like speech coding, speech recognition, speech enhancement and speaker recognition /verification.
404191D	Software Defined Radio	❑ Compare SDR with traditional Hardware Radio HDR. ❑ Implement modern wireless system based on OFDM,

		MIMO & Smart Antenna. ❑ Build experiment with real wireless waveform and applications, accessing both PHY and MAC, Compare SDR versus MATLAB and Hardware Radio ❑ Work on open projects and explore their capability to build their own communication System.
404191E	Audio Video Engineering	❑ Apply the fundamentals of Analog Television and Colour Television standards ❑ Explain the fundamentals of Digital Television, DTV standards and parameters. ❑ Study and understand various HDTV standards and Digital TV broadcasting systems and acquainted with different types of analog, digital TV and HDTV systems. ❑ Understand acoustic fundamentals and various acoustic systems.
404192A	Robotics	❑ Familiar with the history, concept development and key components of robotics technologies. ❑ Implement basic mathematics manipulations of spatial coordinate representation and transformation. ❑ Solve basic robot forward and inverse kinematic problems ❑ Understand and able to solve basic robotic dynamics, path planning and control problems
404192B	Biomedical Electronics	❑ Model a biomedical system. ❑ Understand various methods of acquiring bio signals. Understand various sources of bio ❑ signal distortions and its remedial techniques. ❑ Get an Overview of major Devices currently used in Medical field ❑ The students will have an understanding of analyzing bio-signal and classifying them
404192C	Wireless Sensor Networks	❑ Explain various concepts and terminologies used in WSN ❑ Describe importance and use of radio communication and link management in WSN ❑ Explain various wireless standards and protocols associated with WSN ❑ Recognize importance of localization and routing techniques used in WSN ❑ Understand techniques of data aggregation and importance of security in WSN ❑ Examine the issues involved in design and deployment of WSN
404192D	Renewable Energy Systems	❑ Interpret energy reserves of India and potential of different energy sources. ❑ Measure the solar radiation parameters and performance of different solar collectors. ❑ Calculate different parameters of wind turbine rotor. ❑ Implicit the importance and applications of geothermal and ocean energy. ❑ Demonstrate knowledge in field of fuel cell and potential for power generation

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Course Outcomes (COs)

First Year of Engineering - 2015 Pattern

Course Code	Name of Subject/ Course	Course Outcome (COs)
107009	Engineering Chemistry	❑ Student will able to determine hardness and alkalinity of water technology, to explain different treatment methods and significance of green Chemistry. ❑ Students will able to demonstrate analytical techniques based on principles, theories observations and calculations. ❑ Students will able to select polymer for specific application based on their properties. ❑ Students will able to interpret potential applications of fossil fuels and new source for power generation ❑ Students will able to identify carbon and hydrogen based materials and their application in modern chemistry ❑ Students will able to describe oxidation and reduction reactions in relation to engineering aspects, such as corrosion. .
104012	Basic Electronics Engineering	❑ Understand basic electronic component and measuring devices. ❑ Understand semiconductor devices to study their construction and characteristics. ❑ Understand the characteristics of IC and Op-Amp and identify the internal structure. ❑ Use the basic logic gates to design digital circuits. ❑ Understanding basic of power devices, principal of Sensors and Transducer. ❑ Understand and identify fundamental concepts and components of communication systems.
110003	Fundamentals of Programming Languages-I	❑ Student will able to use modular programming approach in diversified problem domains. ❑ Students will able to apply programming logic to solve real world problems. ❑ Students will able to decide effectiveness of computer based solutions. ❑ Students will be able to use derived data types.
110010	Fundamentals of Programming Languages-II	❑ Student will able to develop programs using object oriented concepts.

		❑ Students will able to design and develop web pages using HTML. ❑ Students will able to design and develop mobile application using Android SDK. ❑ Students will be able to design and develop simple application using Embedded Programming.
107002	Engineering Physics	❑ Apply the basic principles of optics in day-to-day life. ❑ Explain basic acoustical concepts related to the good acoustics of building and ultrasonic phenomenon. ❑ Explain different types of polarized light, LASER light and their applications in various fields. ❑ Apply knowledge of semiconductor physics to advanced technology. ❑ Apply the central concepts of matter waves and principles for analytical abilities in wave mechanics. ❑ Link the applications of superconductivity and nanotechnology in various fields.
101005	Basic Civil & Environmental Engineering	❑ Learn about various branches of civil engineering and to collaborate in interdisciplinary projects. ❑ Identify suitable construction material for load bearing and framed constructions. ❑ Determine elevation of points to reduce levels and to describe methods of contour map preparation. ❑ Justify the role of engineers in sustainable development and EIA with the knowledge of ecological cycles, ecosystems, environmental pollutions and available alternative energy sources. ❑ Apply principles of planning and building by laws in built environment. ❑ Learn about the various sources of pollution and methods to abate it .
101011	Engineering Mechanics	❑ Students will be able to find equivalent force system and Centroids of plane figures and wire bends ❑ Students will be able to analyse the kinematics and kinetics of rectilinear motion using Newton's second law of motion ❑ Students will be able to analyse the kinematics and kinetics of curvilinear motion using Newton's second law of motion ❑ Students will be able to solve motion of particle using work energy and impulse momentum principles ❑ Students will be able to analyse equilibrium of structure without considering friction ❑ Students will be able to analyse structures like trusses, cables, frames and also to apply laws of friction for equilibrium

107001	Engineering Mathematics-I	❑ Student will be able to understand and solve the problems involving System of linear equations arising in all engineering fields, using matrix methods, stability of engineering systems where knowledge of Eigen values and Eigen vectors are essential etc.. ❑ Student will be able to understand and solve the problem involving algebraic and transcendental equations. ❑ Student will be able to understand and solve the problem involving error analysis and approximations.. ❑ Student will be acquainted with the expansion of functions by using Taylor and Maclaurin Series and will be able to determine the higher order derivatives ❑ Student will be able to solve the problem involving ordinary and partial differential equations ❑ Student will be able to understand and solve the problem involving stationary values of functions (Maxima & Minima), arising in optimization problems. .
107008	Engineering Mathematics-II	❑ Solve all types of first order first degree differential equations ❑ Model various physical systems such as Newton's Law of cooling, L-C-R circuits, rectilinear motion, mass-spring systems heat transfer etc. ❑ Apply advanced techniques to evaluate integrals. Design and analyze continuous and discrete system, where knowledge of Fourier series and Harmonic analysis is required ❑ Trace the curves in Cartesian, polar coordinate system & measure the arc lengths of various curves ❑ Apply knowledge of Sphere, cone and cylinder that arise in vector calculus, electro-magnetic field theory, cad-cam, computer graphics etc. ❑ Solve multiple integrals & understand the applications of double and triple integral in various fields. (e.g in 2-D,3-D geometrical things)
102006	Engineering Graphics – I	❑ To draw Basic Engineering drawings formats and take field dimensions. ❑ To be able to take data and transform it into graphic drawings. ❑ To be able to draw different views of Solids. ❑ To be able to draw Engineering Curves. ❑ To be able to draw Orthographic Projections. ❑ Isometric views of objects are used to imagine the shape and size of objects.
111007	Workshop Practices	❑ To comprehend the safety measures required to be taken while using the tools. ❑ To identify different operations and tools used in machine tools.

		❑ To select proper tools required for specific operation and understand applications of these tools. ❑ To acquire practical skills in trade. ❑ To know difference between Hot and Cold Working, Rolling, Forging, Extrusion and Drawing Processes. ❑ Students will learn Foundry practices like pattern making and mold making.
102013	Basic Mechanical Engineering	❑ To understand functions of commonly used mechanical elements. ❑ To learn concept of design in mechanical engineering. ❑ To understand applications of the machines used in industry. ❑ To learn conventional machine tools. ❑ To impart Basic Knowledge of thermodynamics applied to industrial applications. ❑ To understand laying principles of energy conversion systems and power plants.
102014	Engineering Graphics II	❑ Physical realization of drawing and its different parameters required for its presentation. ❑ The drawings of objects which are studied here are used to communicate for different engineering purpose. ❑ Isometric views of the objects are used to imagine the shape and size of objects. Some engineering curves are studied which require to develop actual views of objects. ❑ Learn to sketch and take field dimensions. ❑ Learn to take data and transform it into graphic drawings. ❑ Learn basic engineering drawing formats.
103004	Basic Electrical Engineering	❑ Apply concept of fundamentals of electricity, Mechanical units & Thermal units ❑ Difference between Electrical and Magnetic circuit ❑ Apply concept of electromagnetism for the working of Transformer & Electrostatics. ❑ Apply fundamental of AC circuit. ❑ Draw the phasor diagram of single and three phase circuit ❑ Provide solution of the Network by applying various laws and theorems