

Course Outcomes (COs) 2019- Pattern

SR NO	Course Code	Course Name	Course Outcomes
SE [IT] 2019 Pattern SEM I			
1	214441	Discrete Mathematics	CO1: Formulate and apply formal proof techniques and solve the problems with logical reasoning. CO2: Analyze and evaluate the combinatorial problems by using probability theory. CO3: Apply the concepts of graph theory to devise mathematical models. CO4: Analyze types of relations and functions to provide solution to computational problems. CO5: Identify techniques of number theory and its application. CO6: Identify fundamental algebraic structures.
2	214442	Logic Design and Computer Organization	CO1: Perform basic binary arithmetic & simplify logic expressions. CO2: Grasp the operations of logic ICs and Implement combinational logic functions using ICs. CO3: Comprehend the operations of basic memory cell types and Implement sequential logic functions using CO4: Elucidate the functions & organization of various blocks of CPU. CO5: Understand CPU instruction characteristics, enhancement features of CPU. CO6: Describe an assortment of memory types (with their characteristics) used in computer systems and basic principle of interfacing input, output devices.
3	214443	Data Structures and Algorithms	CO1: Perform basic analysis of algorithms with respect to time and space complexity. CO2: Select appropriate searching and/or sorting techniques in the application development. CO3: Implement abstract data type (ADT) and data structures for given application. CO4: Design algorithms based on techniques like brute-force, divide and conquer, greedy, etc. CO5: Apply implement learned algorithm design techniques and data structures to solve problems.

			CO6: Design different hashing functions and use files organizations.
4	214444	Object Oriented Programming	CO1: Differentiate various programming paradigms.
			CO2: Identify classes, objects, methods, and handle object creation, initialization, and Destruction to model real-world problems.
			CO3: Identify relationship among objects using inheritance and polymorphism principles.
			CO4: Handle different types of exceptions and perform generic programming.
			CO5: Use of files for persistent data storage for real world application.
			CO6: Apply appropriate design patterns to provide object-oriented solutions.
5	214445	Basics of Computer Network	CO1: Understand and explain the concepts of communication theory and compare functions of OSI and TCP/IP model.
			CO2: Analyze data link layer services, error detection and correction, linear block codes, cyclic Codes, framing and flow control protocols.
			CO3: Compare different access techniques, channelization and IEEE standards.
			CO4: Apply the skills of sub netting, super netting and routing mechanisms.
			CO5: Differentiate IPv4 and IPv6.
			CO6: Illustrate services and protocols used at transport layer.
6	214446	Logic Design Computer Organization Lab	CO1: Use logic function representation for simplification with K-Maps and design Combinational logic circuits using SSI & MSI chips.
			CO2: Design Sequential Logic circuits: MOD counters using synchronous counters.
			CO3: Understand the basics of simulator tool & to simulate basic blocks such as ALU & memory.
7	214447	Data Structures and Algorithms Lab	CO1: Analyze algorithms and to determine algorithm correctness and time efficiency class.
			CO2: Implement abstract data type (ADT) and data structures for given application.
			CO3: Design algorithms based on techniques like brute -force, divide and conquer, greedy, etc.).
			CO4: Solve problems using algorithmic design techniques and data structures.
			CO5: Analyze of algorithms with respect to time and space complexity.

8	214448	Object Oriented Programming Lab	CO1: Differentiate various programming paradigms.
			CO2: Identify classes, objects, methods, and handle object creation, initialization, and destruction to model real-world problems.
			CO3: Identify relationship among objects using inheritance and polymorphism.
			CO4: Handle different types of exceptions and perform generic programming.
			CO5: Use file handling for real world application.
			CO6: Apply appropriate design patterns to provide object-oriented solutions.
9	214449	Soft Skill Lab	CO1: Introspect about individual’s goals, aspirations by evaluating one’s SWOC and think creatively.
			CO2: Develop effective communication skills including Listening, Reading, Writing and Speaking.
			CO3: Constructively participate in group discussion, meetings and prepare and deliver Presentations.
			CO4: Write precise briefs or reports and technical documents.
			CO5:Practice professional etiquette, present oneself confidently and successfully handle personal interviews
			CO6: Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.
10	214450	Mandatory Audit Course 3 Ethics and Values in Information Technology	CO1: Adapt the global ethical principles and modern ethical issues.
			CO2: Apprehend ethics in the business relationships and practices of IT.
			CO3:Implement trustworthy computing to manage risk and security vulnerabilities.
			CO4: Analyze concerns of privacy, privacy rights in information-gathering practices in IT.
SE [IT] 2019 Pattern SEM II			
1	207003	Engineering Mathematics- III	CO1: Solve Linear differential equations, essential in modelling and design of computer-based systems.
			CO2: Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.
			CO3: Apply Statistical methods like correlation& regression analysis and probability theory for data analysis and predictions in machine learning.
			CO4:Solve Algebraic &Transcendental equations and System of linear equations using numerical

			Techniques.
			CO5: Obtain Interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing.
2	214451	Processor Architecture	CO1: Apprehend architecture and memory organization of PIC 18 microcontroller. CO2: Implement embedded C programming for PIC 18. CO3: Use concepts of timers and interrupts of PIC 18. CO4: Demonstrate real life applications using PIC 18. CO5: Analyze architectural details of ARM processor.
3	214452	Database Management System	CO1: Apply fundamental elements of database management systems. CO2: Design ER-models to represent simple database application scenarios. CO3: Formulate SQL queries on data for relational databases. CO4: Improve the database design by normalization & to incorporate query processing. CO5: Apply ACID properties for transaction management and concurrency control. CO6: Analyze various database architectures and technologies.
4	214453	Computer Graphics	CO1: Apply mathematical and logical aspects for developing elementary graphics operations like scan conversion of points, lines, circle, and apply it for problem solving. CO2: Employ techniques of geometrical transforms to produce, position and manipulate Objects in 2 dimensional and 3-dimensional space respectively. CO3: Describe mapping from a world coordinates to device coordinates, clipping, and projections in order to produce 3D images on 2D output device. CO4: Apply concepts of rendering, shading, animation, curves and fractals using computer graphics tools in design, development and testing of 2D, 3D modeling applications. CO5: Perceive the concepts of virtual reality.
5	214454	Software Engineering	CO1: Classify various software application domains. CO2: Analyze software requirements by using various modeling techniques. CO3: Translate the requirement models into design models.

			CO4: Apply planning and estimation to any project. CO5: Use quality attributes and testing principles in software development life cycle. CO6: Discuss recent trends in Software engineering by using CASE and agile tools.
6	214455	Programming Skill Development Lab	CO1: Apply concepts related to embedded C programming. CO2: Develop and Execute embedded C program to perform array addition, block transfer, sorting operations CO3: Perform interfacing of real-world input and output devices to PIC18FXXX microcontroller. CO4: Use source prototype platform like Raspberry-Pi/Beagle board/Arduino.
7	214456	Database Management System Lab	CO1: Install and configure database systems. CO2: Analyze database models & entity relationship models. CO3: Design and implement a database schema for a given problem-domain CO4: Implement relational database systems. CO5: Populate and query a database using SQL DDL / DML / DCL commands. CO6: Design a backend database of any one organization: CASE STUDY
8	214457	Computer Graphics Lab	CO1: Apply line & circle drawing algorithms to draw the objects. CO2: Apply polygon filling methods for the object. CO3: Apply polygon clipping algorithms for the object. CO4: Apply the 2D transformations on the object. CO5: Implement the curve generation algorithms. CO6: Demonstrate the animation of any object using animation principles.
9	214458	Project Based Learning	CO1: Design solution to real life problems and analyze its concerns through shared cognition. CO2: Apply learning by doing approach in PBL to promote lifelong learning. CO3: Tackle technical challenges for solving real world problems with team efforts. CO4: Collaborate and engage in multi-disciplinary learning environments.
10	214459	Mandatory Audit Course 4	CO1: Relate the relations between the environment and ecology, estimating water requirement for public water supply scheme.

		Water Supply and Management	CO2: Assess the quality of water as per BIS and select the appropriate treatment method required for the water source. CO3: Analyze the suitable distribution system for a locality and know the appurtenances used. CO4: Summarize the arrangement of water supply and fittings in a building. CO5: Determine the need of conservation of water and rural water supply. CO6: Identify the sources of water pollution and suitable control measures.
Course Outcomes(COs) 2015 Pattern			
SE [IT] 2015 Pattern SEM I			
1	214441	Discrete Structures	CO1: Use set, relation and function to formulate a problem and solve CO2: Use graph theory and trees to formulate the problems and solve them CO3: Use mathematical propositions and proof techniques to check the truthfulness of a real life situation.
2	214442	Computer Organization & Architecture	CO1: Solve problems based on computer arithmetic CO2: Explain processor structure & its functions CO3: Obtain knowledge about micro programming of a processor CO4: Understand concepts related to memory & IO organization CO5: Acquire knowledge about instruction level parallelism & parallel organization of multi-processors & multi core systems
3	214443	Digital Electronics and Logic Design	CO1: 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 CO2: Use logic function representation for simplification with K-Maps and analyze as well as design Combinational logic circuits using SSI & MSI chips CO3: Analyze Sequential circuits like Flip-Flops (Truth Table, Excitation table), their conversion & design the applications CO4: Identify the Digital Circuits, Input/Outputs to replace by FPGA CO5: Use VHDL programming technique with different modeling styles for any digital circuits

4	214444	Fundamentals of Data Structures	CO1: Student will be able to apply appropriate constructs of C language, coding standards for application development
			CO2: Students will be to use dynamic memory allocation concepts and file handling in various application developments.
			CO3: Students will be able to perform basic analysis of algorithms with respect to time and space complexity
			CO4: Students will be able to select appropriate searching and/or sorting techniques in the application development
			CO5: Students will be able to select and use appropriate data structures for problem solving and programming
			CO6: Students will be able to use algorithmic foundations for solving problems and programming
5	214445	Problem Solving and Object Oriented programming	CO1: Break a problem into logical pieces and develop algorithms for solving simple problems
			CO2: Abstract data and entities from the problem domain, build object models and design software solutions using object-oriented principles and strategies
			CO3: Discover, explore and apply tools and best practices in object-oriented programming
			CO4: Develop programs that appropriately utilize key object-oriented concepts
6	214446	Digital Laboratory	CO1: 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
			CO2: Use logic function representation for simplification with K-Maps and analyze as well as design Combinational logic circuits using SSI & MSI chips
			CO3: Analyze Sequential circuits like Flip-Flops (Truth Table, Excitation table) & design the applications like Asynchronous and Synchronous Counters
			CO4: Design Sequential Logic circuits: Sequence generators, MOD counters with registers/Counters using synchronous /asynchronous counters
			CO5: 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
			CO6: Understand and implement the design Steps, main programming technique with different modeling styles for any digital circuits with VHDL

			Programming.
TE [IT] 2015 Pattern SEM I			
1	314441	Theory of Computation	C01: To construct finite state machines to solve problems in computing. C02: To write mathematical expressions for the formal languages C03: To apply well defined rules for syntax verification. C04: To construct and analyze Push Down, Post and Turing Machine for formal languages. C05: To express the understanding of the decidability and decidability problems. C06: To express the understanding of computational complexity.
2	314442	Database Management Systems	C01: To define basic functions of DBMS & RDBMS. C02: To analyze database models & entity relationship models. C03: To design and implement a database schema for a given problem-domain. C04: To populate and query a database using SQL DML/DDL commands. C05: Do Programming in PL/SQL including stored procedures, stored functions, cursors and packages. C06: To appreciate the impact of analytics and big data on the information industry and the external ecosystem for analytical and data services.
3	314443	Software Engineering & Project Management	C01: To identify unique features of various software application domains and classify software applications. C02: To choose and apply appropriate lifecycle model of software development. C03: To describe principles of agile development, discuss the SCRUM process and distinguish agile process model from other process models. C04: To analyze software requirements by applying various modeling techniques. C05: To list and classify CASE tools and discuss recent trends and research in software engineering. C06: To understand IT project management through life cycle of the project and future trends in IT Project Management.
4	314444	Operating System	C01: Fundamental understanding of the role of

			Operating Systems.
			C02: To understand the concept of process and thread management.
			C03: To apply the cons of process/thread scheduling.
			C04: To apply the concept of process synchronization, mutual exclusion and the deadlock.
			C05: To realize the concept of I/O management and File system.
			C06: To understand the various memory management techniques.
5	314445	Human-Computer Interaction	C01: To explain importance of HCI study and principles of user-centered design (UCD) approach.
			C02: To develop understanding of human factors in HCI design.
			C03: To develop understanding of models, paradigms and context of interactions.
			C04: To design effective user-interfaces following a structured and organized UCD process.
			C05: To evaluate usability of a user-interface design.
			C06: To apply cognitive models for predicting human-computer-interactions.
6	314446	Software Laboratory-I	C01: To install and configure database systems.
			C02: To analyze database models & entity relationship models
			C03: To design and implement a database schema for a given problem-domain
			C04: To understand the relational and document type database systems
			C05: To populate and query a database using SQL DML/DDL commands
			C06: To populate and query a database using MongoDB commands.
7	314447	Software Laboratory-II	C01: To understand the basics of Linux commands and program the shell of Linux.
			C06: To develop various system programs for the functioning of operating system.
			C06: To implement basic building blocks like processes, threads under the Linux.
			C06: To develop various system programs for the functioning of OS concepts in user space like concurrency control and file handling in Linux.

			CO6: To design and implement Linux Kernel Source Code. CO6: To develop the system program for the functioning of OS concepts in kernel space like embedding the system call in any Linux kernel.
8	314448	Software Laboratory-III	CO1: To identify the needs of users through requirement gathering. CO2: To apply the concepts of Software Engineering process models for project development. CO3: To apply the concepts of HCI for user-friendly project development. CO4: To deploy website on live webserver and access through URL. CO5: To understand, explore and apply various web technologies. CO6: To develop team building for efficient project development.
9	314449	Audit Course 3- Leadership and Personality Development	CO1: To exhibit responsible decision-making and personal accountability CO2: To demonstrate an understanding of group dynamics and effective teamwork CO3: To develop a range of leadership skills and abilities such as effectively leading change, resolving conflict, and motivating others. To develop overall personality
TE [IT] 2015 Pattern SEM II			
1	314450	Computer Network Technology	CO1: To know Responsibilities, services offered and protocol used at each layer of network. CO2: To understand different addressing techniques used in network. CO3: To know the difference between different types of network. CO4: To know the different wireless technologies and IEEE standards. CO5: To use and apply the standards and protocols learned, for application development. CO6: To understand and explore recent trends in network domain.
2	314451	Systems Programming	CO1: To learn independently modern software development tools and creates novel solutions for language processing applications. CO2: To design and implement assemblers and macro processors. CO3: To use tool LEX for generation of Lexical Analyzer.

			C04: To use YACC tool for generation of syntax analyzer. C05: To generate output for all the phases of compiler. C06: To apply code optimization in the compilation process.
3	314452	Design and Analysis of Algorithms	C01: To calculate computational complexity using asymptotic notations for various algorithms. C02: To apply Divide & Conquer as well as Greedy approach to design algorithms. C03: To practice principle of optimality. C04: To illustrate different problems using Backtracking. C05: To compare different methods of Branch and Bound strategy. C06: To explore the concept of P, NP, NP-complete, NP-Hard and parallel algorithms.
4	314453	Cloud Computing	C01: To understand the need of Cloud based solutions C02: To understand Security Mechanisms and issues in various Cloud Applications C03: To explore effective techniques to program Cloud Systems. C04: To understand current challenges and trade-offs in Cloud Computing. C05: To find challenges in cloud computing and delve into it to effective solutions. C06: To understand emerging trends in cloud computing.
5	314454	Data Science & Big Data Analytics	C01: To learn and apply different mathematical models for Big Data. C02: To demonstrate their Big Data learning skills by developing industry or research applications. C03: To analyze each learning model come from a different algorithmic approach and it will perform differently under different datasets. C04: To understand needs, challenges and techniques for big data visualization. C05: To learn different programming platforms for big data analytics. C06: To implement small size network and its use of various networking commands.
6	314455	SOFTWARE LABORATORY – IV	C01: To understand and use various networking and simulations tools. C02: To configure various client/server environments to use application layer protocols

			C03: To understand the protocol design at various layers. C04: To explore use of protocols in various wired and wireless applications. C05: To develop applications on emerging trends. C06: To design and implement two pass assembler for hypothetical machine instructions.
7	314456	SOFTWARE LABORATORY – V	C01: To design and implement different phases of compiler (Lexical Analyzer, Parser, Intermediate code generation) C02: To use the compile generation tools such as “Lex” and “YACC”. C03: To apply algorithmic strategies for solving various problems. C04: To compare various algorithmic strategies. C05: To analyze the solution using recurrence relation. C06: To apply Big data primitives and fundamentals for application development.
8	314457	SOFTWARE LABORATORY – VI	C01: To explore different Big data processing techniques with use cases. C01: To apply the Analytical concept of Big data using R/Python. C02: To visualize the Big Data using Tableau. C03: To design algorithms and techniques for Big data analytics. C04: To design Big data analytic application for emerging trends. C05: To Gather, organize, summarize and interpret technical literature with the purpose of formulating a project proposal.
9	314458	PROJECT BASED SEMINAR	C01: To write a technical report summarizing state-of-the-art on an identified topic. C02: Present the study using graphics and multimedia presentations. C03: Define intended future work based on the technical review. C04: To explore and enhance the use of various presentation tools and techniques. C05: To understand scientific approach for literature survey and paper writing. C06: Identify the health- and skill-related fitness components.
10	314459	Audit Course 4 -Health & Fitness Management	C01: Understand the benefits of physical fitness, and the underlying principles, physiology, and practices for fitness development.

			CO2: Apply of fitness management skills and strategies for the development of physical activity habits and personal fitness by the students. CO3: Aware about healthy diet for physical and mental fitness of an individual. CO4: Understand importance of mental fitness along with physical fitness by practicing yoga, meditation and relaxation techniques.
BE [IT] 2015 Pattern SEM I			
1	414453	Information and Cyber Security	CO1: Use basic cryptographic techniques in application development. CO2: Apply methods for authentication, access control, intrusion detection and prevention. CO3: To apply the scientific method to digital forensics and perform forensic investigations. CO4: To develop computer forensics awareness. CO5: Ability to use computer forensics tools.
2	414454	Machine Learning and Applications	CO1: Model the learning primitives. CO2: Build the learning model.. CO3: Tackle real world problems in the domain of Data Mining and Big Data Analytics, Information Retrieval, Computer vision, Linguistics and Bioinformatics.
3	414455	Software Design and Modeling	CO1: Understand object oriented methodologies, basics of Unified Modeling Language (UML). CO2: Understand analysis process, use case modeling, domain/class modeling CO3: Understand interaction and behavior modeling. CO4: Understand design process and business, access and view layer class design CO5: Get started on study of GRASP principles and GoF design patterns. CO6: Get started on study of architectural design principles and guidelines in the various type of application development.
4	414456	Elective-I Business Analytics and Intelligence	CO1: Comprehend the Information Systems and development approaches of Intelligent Systems. CO2: Evaluate and rethink business processes using information systems. CO3: Propose the Framework for business intelligence. CO4: Get acquainted with the Theories, techniques, and considerations for capturing organizational intelligence.

			C05: Align business intelligence with business strategy. C06: Apply the techniques for implementing business intelligence systems.
5	414457	Elective-II Software Testing and Quality Assurance	C01: Test the software by applying testing techniques to deliver a product free from bugs. C02: Investigate the scenario and to select the proper testing technique. C03: Explore the test automation concepts and tools and estimation of cost, schedule based on standard metrics. C04: Understand how to detect, classify, prevent and remove defects. C05: Choose appropriate quality assurance models and develop quality. C06: Ability to conduct formal inspections, record and evaluate results of inspections.
6	414458	Computer Laboratory-VII	C01: The students will be able to implement and port controlled and secured access to software systems and networks. C02: The students will be able to build learning software in various domains.
7	414459	Computer Laboratory-VIII	C01: Draw, discuss different UML 2.0 diagrams, their concepts, notation, advanced notation, forward and reverse engineering aspects. C01: Identify different software artifacts used to develop analysis and design model from requirements. C02: Develop use case model. C03: Develop, implement analysis model and design model. C04: Develop, implement Interaction and behavior Model. C05: Implement an appropriate design pattern to solve a design problem.
8	414460	Project Phase-I	C01: 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. C02: To function effectively as a team to accomplish a desired goal. C03: An understanding of professional, ethical, legal, security and social issues and responsibilities related to Information Technology Project.

9	CO414461	Audit Course-V- Critical Thinking	CO1: If students whole-heartedly participate in the course, they can expect to be smarter, stronger and more confident thinkers.
			CO2: They can embark on a life-long journey of “self-directed learning”.
BE [IT] 2015 Pattern SEM II			
1	414462	Distributed Computing System	CO1: Understand the principles and desired properties of distributed systems based on different application areas.
			CO2: Understand and apply the basic theoretical concepts and algorithms of distributed systems in problem solving.
			CO3: Recognize the inherent difficulties that arise due to distributed-ness of computing resources.
			CO4: Identify the challenges in developing distributed applications
2	414463	Ubiquitous Computing	CO1: Demonstrate the knowledge of design of Ubicomp and its applications.
			CO2: Explain smart devices and services used Ubicomp.
			Describe the significance of actuators and controllers in real time application design.
			CO3: Use the concept of HCI to understand the design of automation applications.
			CO4: Classify Ubicomp privacy and explain the challenges associated with Ubicomp privacy.
			CO5: Get the knowledge of ubiquitous and service oriented networks along with Ubicomp
3	414464	Elective-III Internet of Things (IoT)	CO1: Explain what is internet of things.
			CO2: Explain architecture and design of IoT
			CO3: Describe the objects connected in IoT
			CO4: Understand the underlying Technologies.
			CO5: Understand the platforms in IoT
			CO6: Understand cloud interface to IoT
4	414465	Elective-IV Social Media Analytics	CO1: Understand the basics of Social Media Analytics.
			CO2: Explain the significance of Data mining in Social media.
			CO3: Demonstrate the algorithms used for text mining.
			CO4: Apply network measures for social media data.
			CO5: Explain Behavior Analytics techniques used for social media data.
			CO6: Apply social media analytics for Face book and Twitter kind of applications.

5	414466	Computer Laboratory-IX	C01: Demonstrate knowledge of the core concepts and techniques in distributed systems.
			C02: Learn how to apply principles of state-of-the-Art Distributed systems in practical application.
			C03: Design, build and test application programs on distributed systems.
6	414467	Computer Laboratory-X	C01: Set up the Android environment and explain the Evolution of cellular networks.
			C02: Develop the User Interfaces using pre-built Android UI components.
			C03: Create applications for performing CURD SQLite database operations using Android.
			C04: Create the smart android applications using the data captured through sensors.
			C05: Implement the authentication protocols between two mobile devices for providing. Security.
			C06: Analyze the data collected through android sensors using any machine learning algorithm.
7	414468	Project Work	C01: Learn teamwork.
			C02: Be well aware about Implementation phase.
			C03: Get exposure of various types of testing methods and tools.
			C04: Understand the importance of documentation.
8	414469	Audit Course-VI -IoT Applications in Engineering Field	C01: Expand your knowledge of Internet of Things.
			C02: Discover how you can use IoT in your Engineering applications.
			C03: Build more effective hands on with IoT elements.
			C04: Expand the practical knowledge of using IoT components like sensors, processors.
			C05: Expand the understanding of using different protocols.