THE MET LEAGUE OF COLLEGES
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Bhujbal Knowledge City

Institute of Engineering
Department of Information Technology

Course Outcomes

SE (Semester-I)
2019 PATTERN

214441 : Discrete Mathematics	**214441.01 (CO1)**	Formulate and apply formal proof techniques and solve the problems with logical reasoning
	214441.02 (CO2)	Analyze and evaluate the combinatorial problems by using probability theory.
	214441.03 (CO3)	Apply the concepts of graph theory to devise mathematical models .
	214441.04 (CO4)	Analyze types of relations and functions to provide solution to computational problems
	214441.05 (CO5)	Identify techniques of number theory and its application.
	214441.06 (CO6)	Identify fundamental algebraic structures.
214442:Logic Design & Computer Organization	**214442.01 (CO1)**	Perform basic binary arithmetic & simplify logic expressions
	214442.02 (CO2)	Grasp the operations of logic ICs and Implement combinational logic functions using ICs .
	214442.03 (CO3)	Comprehend the operations of basic memory cell types and Implement sequential logic functions using ICs.
	214442.04 (CO4)	Elucidate the functions & organization of various blocks of CPU.
	214442.05 (CO5)	Understand CPU instruction characteristics, enhancement features of CPU.
	214442.06 (CO6)	Describe an assortment of memory types (with their characteristics) used in computer systems and basic principle of interfacing input, output devices.
214443: Data Structure & Algorithms	**214443.01 (CO1)**	Perform basic analysis of algorithms with respect to time and space complexity.
	214443.02 (CO2)	Select appropriate searching and/or sorting techniques in the application development.
	214443.03 (CO3)	Implement abstract data type (ADT) and data structures for given application.
	214443.04 (CO4)	Design algorithms based on techniques like brute -force, divide and conquer, greedy, etc
	214443.05 (CO5)	Apply implement learned algorithm design techniques and data structures to solve problems.
	214443.06 (CO6)	Design different hashing functions and use files organizations.
214444: Object-Oriented Programming	**214444.01 (CO1)**	Differentiate various programming paradigms.
	214444.02 (CO2)	Identify classes, objects, methods, and handle object creation, initialization, and Destruction to model real-world problems
	214444.03 (CO3)	Identify relationship among objects using inheritance and polymorphism principles.
	214444.04 (CO4)	Handle different types of exceptions and perform generic programming.

	214444.05 (CO5)	Use of files for persistent data storage for real world application.
	214444.06 (CO6)	Apply appropriate design patterns to provide object-oriented solutions.
214445: Basics of Computer Network	**214445.01 (CO1)**	Understand and explain the concepts of communication theory and compare functions of OSI and TCP/IP model.
	214445.02 (CO2)	Analyze data link layer services, error detection and correction, linear block codes, cyclic Codes, framing and flow control protocols.
	214445.03 (CO3)	Compare different access techniques, channelization and IEEE standards.
	214445.04 (CO4)	Apply the skills of subnetting, supernetting and routing mechanisms.
	214445.05 (CO5)	Differentiate IPv4 and IPv6.
	214445.06 (CO6)	Illustrate services and protocols used at transport layer.
214446: Logic Design &Computer Organization Lab	**214446.01 (CO1)**	Use logic function representation for simplification with K-Maps and design Combinational logic circuits using SSI & MSI chips.
	214446.02 (CO2)	Design Sequential Logic circuits: MOD counters using synchronous counters.
	214446.03 (CO3)	Understand the basics of simulator tool & to simulate basic blocks such as ALU & memory
214447: Data Structure & Algorithms Lab	**214447.01 (CO1)**	Analyze algorithms and to determine algorithm correctness and time efficiency class.
	214447.02 (CO2)	Implement abstract data type (ADT) and data structures for given
	214447.03 (CO3)	Design algorithms based on techniques like brute -force, divide and conquer, greedy, etc.)
	214447.04 (CO4)	Solve problems using algorithmic design techniques and data structures.
214447: Data Structure & Algorithms Lab	**214447.01 (CO1)**	Analyze algorithms and to determine algorithm correctness and time efficiency class.
	214447.02 (CO2)	Implement abstract data type (ADT) and data structures for given application.
	214447.03 (CO3)	Design algorithms based on techniques like brute -force, divide and conquer, greedy, etc.).
	214447.04 (CO4)	Solve problems using algorithmic design techniques and data structures.
	214447.05 (CO5)	Analyze of algorithms with respect to time and space complexity.
214448: Object Oriented Programming Lab	**214448.01 (CO1)**	Differentiate various programming paradigms.
	214448.02 (CO2)	Identify classes, objects, methods, and handle object creation, initialization, and destruction to model real-world problems.
	214448.03 (CO3)	Identify relationship among objects using inheritance and polymorphism.
	214448.04 (CO4)	Handle different types of exceptions and perform generic programming.
	214448.05 (CO5)	Use file handling for real world application.
	214448.06 (CO6)	Apply appropriate design patterns to provide object-oriented solutions
	214449.01 (CO1)	Introspect about individual's goals, aspirations by evaluating one's SWOC and think creatively.
	214449.02 (CO2)	Develop effective communication skills including Listening, Reading, Writing and Speaking.

214449: Soft Skill Lab	**214449.03 (CO3)**	Constructively participate in group discussion, meetings and prepare and deliver Presentations.
	214449.04 (CO4)	Write precise briefs or reports and technical documents
	214449.05 (CO5)	Practice professional etiquette, present oneself confidently and successfully handle personal interviews .
	214449.06 (CO6)	Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.
Audit Course I 210250(A) : Ethics and Values in Information Technology	**210250.01 (CO1)**	Adapt the global ethical principles and modern ethical issues.
	210250.02 (CO2)	Apprehend ethics in the business relationships and practices of IT.
	210250.03 (CO3)	Implement trustworthy computing to manage risk and security vulnerabilities.
	210250.04 (CO4)	Analyze concerns of privacy, privacy rights in information-gathering practices in IT.
Audit Course I 210250(B): Quantitative Aptitude & Logical Reasoning	**210250.01 (CO1)**	Apply basic concepts of quantitative abilities.
	210250.02 (CO2)	Use logical reasoning for solving real world problems.
	210250.03 (CO3)	Compete in examinations like internships, industry placements, postgraduate admissions, civil services etc.
Audit Course I 210250(C): Language Study Japanese -Module I	**210250.01 (CO1)**	Converse with simple sentences in Japanese.
	210250.02 (CO2)	Recognize and read simple sentences in Japanese.
	210250.03 (CO3)	Write simple sentences in Japanese.
	210250.04 (CO4)	Be aware about Japanese society and people
Audit Course I 210250(D): Cyber Security and Law	**210250.01 (CO1)**	Understand the basic concepts of cyber security and its abilities
	210250.02 (CO2)	Analyze and evaluate the cyber security needs of an organization.
	210250.03 (CO3)	Understand the importance of cyber laws and its practices.
	210250.04 (CO4)	Determine and analyze software vulnerabilities and security solutions to reduce the risk of exploitation

SE (Semester-II) 2019 Pattern		
207003: Engineering Mathematics III	**207003.01 (CO1)**	Solve Linear differential equations, essential in modelling and design of computer-based systems.
	207003.02 (CO2)	Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.
	207003.03 (CO3)	Apply Statistical methods like correlation& regression analysis and probability theory for data analysis and predictions in machine learning.
	207003.04 (CO4)	Solve Algebraic &Transcendental equations and System of linear equations using numerical techniques.
	207003.05 (CO5)	Obtain Interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing.
214451: Processor Architecture	**214451.01 (CO1)**	Apprehend architecture and memory organization of PIC 18 microcontroller.
	214451.02 (CO2)	Implement embedded C programming for PIC 18.
	214451.03 (CO3)	Use concepts of timers and interrupts of PIC 18.
	214451.04 (CO4)	Demonstrate real life applications using PIC 18.
	214451.05 (CO5)	Analyze architectural details of ARM processor.
214452: Database Management System	**214452.01 (CO1)**	Apply fundamental elements of database management systems. Learn architectural details of 80386 microprocessor
	214452.02 (CO2)	Design ER-models to represent scenarios.
	214452.03 (CO3)	Formulate SQL queries on data for relational databases.
	214452.04 (CO4)	Improve the database design by normalization & to incorporate query processing.
	214452.05 (CO5)	Apply ACID properties for transaction management and concurrency control
	214452.06 (CO6)	Analyze various database architectures and technologies.
214453: Computer Graphics	**214453.01 (CO1)**	Apply mathematical and logical aspects for developing elementary graphics operations like scan conversion of points, lines, circle, and apply it for problem solving.
	214453.02 (CO2)	Employ techniques of geometrical transforms to produce, position and manipulate Objects in 2 dimensional and 3-dimensional space respectively.
	214453.03 (CO3)	Describe mapping from a world coordinates to device coordinates, clipping, and projections in order to produce 3D images on 2D output device.
	214453.04 (CO4)	Apply concepts of rendering, shading, animation, curves and fractals using computer graphics tools in design, development and testing of 2D, 3D modeling applications.
	214453.05 (CO5)	Perceive the concepts of virtual reality.
214454: Software Engineering	**214454.01 (CO1)**	Classify various software application domains.
	214454.02 (CO2)	Analyze software requirements by using various modeling techniques
	214454.03 (CO3)	Translate the requirement models into design models.
	214454.04 (CO4)	Apply planning and estimation to any project.
	214454.05 (CO5)	Use quality attributes and testing principles in software development life cycle.
	214454.06 (CO6)	Discuss recent trends in Software engineering by using CASE and agile tools.

214455: Programming Skill Development Lab	**214455.01 (CO1)**	Apply concepts related to embedded C programming.
	214455.02 (CO2)	Develop and Execute embedded C program to perform array addition, block transfer, sorting operations
	214455.03 (CO3)	Perform interfacing of real-world input and output devices to PIC18FXXX microcontroller
	214455.04 (CO4)	Use source prototype platform like Raspberry-Pi/Beagle board/Arduino
214456: Database Management System Lab	**214456.01 (CO1)**	Install and configure database systems.
	214456.02 (CO2)	Analyze database models & entity relationship models.
	214456.03 (CO3)	Design and implement a database schema for a given problem- domain
	214456.04 (CO4)	Implement relational database systems.
	214456.05 (CO5)	Populate and query a database using SQL DDL / DML / DCL commands.
	214456.06 (CO6)	Design a backend database of any one organization: CASE STUDY
214457: Computer Graphics Lab	**214457.01 (CO1)**	Apply line& circle drawing algorithms to draw the objects.
	214457.02 (CO2)	Apply polygon filling methods for the object.
	214457.03 (CO3)	Apply polygon clipping algorithms for the object.
	214457.04 (CO4)	Apply the 2D transformations on the object.
	214457.05 (CO5)	Implement the curve generation algorithms.
	214457.06 (CO6)	Demonstrate the animation of any object using animation principles
214458: Project Based Learning	**210258.01 (CO1)**	Design solution to real life problems and analyze its concerns through shared cognition
	210258.02 (CO2)	Apply learning by doing approach in PBL to promote lifelong learning.
	210258.03 (CO3)	Tackle technical challenges for solving real world problems with team efforts.
	210258.04 (CO4)	Collaborate and engage in multi-disciplinary learning environments
214459 (A) : Mandatory Audit course 4: Water Supply and Management	**210259.01 (CO1)**	Relate the relations between the environment and ecology, estimating water requirement for public water supply scheme.
	210259.02 (CO2)	Assess the quality of water as per BIS and select the appropriate treatment method required for the water source.
	210259.03 (CO3)	Analyze the suitable distribution system for a locality and know the appurtenances used.
	210259.04 (CO4)	Summarize the arrangement of water supply and fittings in a building.
	210259.05 (CO5)	Determine the need of conservation of water and rural water supply.
	210259.06 (CO6)	Identify the sources of water pollution and suitable control measures.
214459 (B): Mandatory Audit course 4 : Language Study Japanese:Module-II	**210259.01 (CO1)**	Have Japanese Communicative competence for primitive Social conversation in Japanese
	210259.02 (CO2)	Comprehend Grammar of Japanese Script
	210259.03 (CO3)	Translate simple sentences from Japanese to English and vice a versa

	210259.04 (CO4)	Be aware about Japanese society and people
214459 (C): Mandatory Audit course 4 : e-Waste Management & Pollution Control	**210259.01 (CO1)**	Discuss various types of e-waste sources.
	210259.02 (CO2)	Understand impact of various e-wastes.
	210259.03 (CO3)	Identify characteristics of various e-Waste pollutants
	210259.04 (CO4)	Understand process of e-Waste Recycling and relevant technologies.
	210259.05 (CO5)	Discuss causes, effects and control measures of different environment pollution
	210259.06 (CO6)	Demonstrate Safe methods for disposal of e-waste and controlling the pollution.
214459 (D): Mandatory Audit course 4 : Intellectual Property Rights	**210259.01 (CO1)**	Exhibit the concepts of Intellectual Property Rights
	210259.02 (CO2)	Differentiate among different IPR
	210259.03 (CO3)	Formulate and characterize innovative ideas and inventions into IPR
	210259.04 (CO4)	Demonstrate knowledge of advances in patent law and IP regulations
TE(SEMESTER-I) 2019 Pattern		
314441: Theory of Computation	**314441.01 (CO1)**	Construct finite automata and its variants to solve computing problems.
	314441.02 (CO2)	Write regular expressions for the regular languages and finite automata
	314441.03 (CO3)	Identify types of grammar, design and simplify Context Free Grammar.
	314441.04 (CO4)	Construct Pushdown Automata machine for the Context Free Language
	314441.05 (CO5)	Design and analyze Turing machines for formal languages.
	314441.06 (CO6)	Understand decidable and undesirable problems, analyze complexity classes
314442: Operating Systems	**314442.01 (CO1)**	Explain the role of Modern Operating Systems.
	314442.02 (CO2)	Apply the concepts of process and thread scheduling.
	314442.03 (CO3)	Illustrate the concept of process synchronization, mutual exclusion and the deadlock.
	314442.04 (CO4)	Implement the concepts of various memory management techniques
	314442.05 (CO5)	Make use of concept of I/O management and File system.
	314442.06 (CO6)	Understand Importance of System software.
314443: Machine Learning	**314443.01 (CO)**	Apply basic concepts of machine learning and different types of machine learning algorithms.
	314443.02 (CO2)	Differentiate various regression techniques and evaluate their performance
	314443.03 (CO3)	Compare different types of classification models and their relevant application.
	314443.04 (CO4)	Illustrate the tree-based and probabilistic machine learning algorithms.

	314443.05 (CO5)	Identify different unsupervised learning algorithms for the related real world problems.
	314443.06 (CO6)	Apply fundamental concepts of ANN.
314444: Human Computer Interaction	**314444.01 (CO1)**	Explain importance of HCI study and principles of user-centered design (UCD) approach
	314444.02 (CO2)	Develop understanding of human factors in HCI design.
	314444.03 (CO3)	Develop understanding of models, paradigms, and context of interactions.
	314444.04 (CO4)	Design effective user-interfaces following a structured and organized UCD process
	314444.05 (CO5)	Evaluate usability of a user-interface design.
	314444.06 (CO6)	Apply cognitive models for predicting human-computerinteractions.
314445(A) : Elective -I : Design and Analysis of Algorithm	**314445.01 (CO1)**	Calculate computational complexity using asymptotic notations for various algorithms.
	314445.02 (CO2)	Apply Divide & Conquer as well as Greedy approach to design algorithms.
	314445.03 (CO3)	Understand and analyze optimization problems using dynamic programming.
	314445.04 (CO4)	Illustrate different problems using Backtracking.
	314445.05 (CO5)	Compare different methods of Branch and Bound strategy.
	314445.06 (CO6)	Classify P, NP, NP-complete, NP-Hard problems.
314445(B): Elective -I : Advanced Database Management System	**314445.01 (CO1)**	Differentiate relational and object-oriented databases.
	314445.02 (CO2)	Illustrate parallel & distributed database architectures.
	314445.03 (CO3)	Apply concepts of NoSQL Databases.
	314445.04 (CO4)	Explain concepts of data warehouse and OLAP technologies
	314445.05 (CO5)	Apply data mining algorithms and various software tools.
	314445.06 (CO6)	Comprehend emerging and enhanced data models for advanced applications
314445(C) : Elective -I : Design Thinking	**314445.01 (CO1)**	Identify need and features of design thinking.
	314445.02 (CO2)	Identify the opportunities and challenges for design thinking innovation.
	314445.03 (CO3)	Learn the process of design thinking using various tools.
	314445.04 (CO4)	Summarize and learn the various prototyping techniques.
	314445.05 (CO5)	Enlist the activities carried out in Test and reflect phase of design thinking.
	314445.06 (CO6)	Interpret the design thinking disruptive innovations through case studies.
314445(D) : Elective -I : Internet of Things	**314445.01 (CO1)**	Discuss fundamentals, architecture and framework of IoT.
	314445.02 (CO2)	Select suitable sensors and actuators for real time scenarios.
	314445.03 (CO3)	Justify the significance of protocol for wireless communication and IoT challenges.

	314445.04 (CO4)	Understand the Python programming for development of IoT applications.
	314445.05 (CO5)	Understand the cloud interfacing technologies.
	314445.06 (CO6)	Design and Implement real time IoT applications.
314446 : Operating Systems Lab	**314446.01 (CO1)**	Apply the basics of Linux commands.
	314446.02 (CO2)	Build shell scripts for various applications.
	314446.03 (CO3)	Implement basic building blocks like processes, threads under the Linux.
	314446.04 (CO4)	Develop various system programs for the functioning of OS concepts in user space like concurrency control, CPU Scheduling, Memory Management and Disk Scheduling in Linux.
	314446.05 (CO5)	Develop system programs for Inter Process Communication in Linux
314447: Human Computer Interaction Laboratory	**314447.01 (CO1)**	Differentiate between good design and bad design.
	314447.02 (CO2)	Analyze creative design in the surrounding.
	314447.03 (CO3)	Assess design based on feedback and constraint.
	314447.04 (CO4)	Design paper-based prototypes and use wire frame.
	314447.05 (CO5)	Implement user-interface design using web technology.
	314447.06 (CO6)	Evaluate user-interface design using HCI evaluation techniques.
314448 : Laboratory Practice-I (Machine Learning)	**314448.01 (CO1)**	Implement different supervised and unsupervised learning algorithms.
	314448.02 (CO2)	Evaluate performance of machine learning algorithms for real-world applications.
314448 (A) : Laboratory Practice-I (Design of Analysis Algorithm)	**314448.01 (CO1)**	Implement the various algorithmic design strategies and use it to solve real time problems/ applications
	314448.02 (CO2)	Apply Divide & Conquer as well as Greedy approach to design algorithms.
	314448.03 (CO3)	Understand and analyze optimization problems using dynamic programming.
314448 (B) : Laboratory Practice-I (ADBMS)	**314448.01 (CO1)**	Understand Advanced Database Programming Languages.
	314448.02 (CO2)	Master the basic concepts of NoSQL Databases.
	314448.03 (CO3)	Install and configure database systems.
	314448.04 (CO4)	Populate and query a database using MongoDB commands.
	314448.05 (CO5)	Design data warehouse schema of any one real-time: CASE STUDYC.
	314448.06 (CO6)	Develop small application with NoSQL Database for back-end.
314448 (C) : Laboratory Practice-I (Design Thinking)	**314448.01 (CO1)**	Frame and Design Challenge by performing STEEP Analysis, Conduct Interviews, design and ask 5x Why and 5W+H questions
	314448.02 (CO2)	Demonstrate the activities to empathize with the users by creation of Empathy Map, Persona Development, Customer Journey Map.
	314448.03 (CO3)	Define and ideate process of design thinking and perform brainstorming, selection of ideas, create a storyboard and design paper prototyping or digital prototyping for chosen design challenge.

314448 (D) : Laboratory Practice-I (Internet of Things)	**314448.01 (CO1)**	Design and implement real time applications with sensors and actuators.
	314448.02 (CO2)	Design and develop real time IoT based application by cloud interfacing.
314449 : Seminar	**314449.01 (CO1)**	Understand, interpret and summarize technical literature.
	314449.02 (CO2)	Demonstrate the techniques used in the paper.
	314449.03 (CO3)	Distinguish the various techniques required to accomplish the task.
	314449.04 (CO4)	Identify intended future work based on the technical review.
	314449.05 (CO5)	Prepare and present the content through various presentation tools and techniques in effective manner.
	314449.06 (CO6)	Keep audience engaged through improved interpersonal skills.
Mandatory Audit Course 5 314450 (A) : Banking and Insurance	**314450.01 (CO1)**	Differentiate between types of banks and their working.
	314450.02 (CO2)	Carry out banking transactions on their own.
	314450.03 (CO3)	Decide which insurance policy they should buy.
	314450.04 (CO4)	Handle investing in annuities and claim settlements.
Mandatory Audit Course 5 314450 (B) : Startup Ecosystems	**314450.01 (CO1)**	Identify Startup opportunities
	314450.02 (CO2)	Explain legal and other requirements for new ventures
	314450.03 (CO3)	Analyze financial Issues of startups
Mandatory Audit Course 5 314450 (C) : Foreign Language-(Japanese Language-III)	**314450.01 (CO1)**	Ability of basic communication.
	314450.02 (CO2)	Knowledge skills).
	314450.03 (CO3)	Knowledge etiquettes.
	314450.04 (CO4)	Develop interest to pursue professional Japanese Language course.

TE (Semester-II) 2019 Pattern		
314451: Computer Network and Security	**314451.01 (CO1)**	Know Responsibilities, services offered and protocol used at application layer of network
	314451.02 (CO2)	Understand wireless network and different wireless standards.
	314451.03 (CO3)	Recognize the Adhoc Network's MAC layer, routing protocol and Sensor network architecture.
	314451.04 (CO4)	Define the principal concepts of network security and Understand network security threats, security services, and countermeasures
	314451.05 (CO5)	Apply basic cryptographic techniques in application development.
	314451.06 (CO6)	Gain a good comprehension of the landscape of cyber security Vulnerabilities & describe typical threats to modern digital systems.
314452: Data Science and Big Data Analytics	**314452.01 (CO1)**	To introduce basic need of Big Data and Data science to handle huge amount of data.
	314452.02 (CO2)	To understand the basic mathematics behind the Big data.
	314452.03 (CO3)	To understand the different Big data processing technologies.
	314452.04 (CO4)	To understand and apply the Analytical concept of Big data using Python.
	314452.05 (CO5)	To visualize the Big Data using different tools.
	314452.06 (CO6)	To understand the application and impact of Big Data.
314453: Web Application Development	**314453.01 (CO1)**	Develop Static and Dynamic website using technologies like HTML, CSS, Bootstrap.
	314453.02 (CO2)	Demonstrate the use of web scripting languages.
	314453.03 (CO3)	Develop web application with Front End & Back End Technologies.
	314453.04 (CO4)	Develop mobile website using JQuery Mobile.
	314453.05 (CO5)	Deploy web application on cloud using AWS.
314454 (A): Elective-II (Artificial Intelligence)	**314454.01 (CO1)**	Understand the fundamental concepts of Artificial Intelligence.
	314454.02 (CO2)	Identify and apply appropriate search strategies for any AI problem.
	314454.03 (CO3)	Explore knowledge reasoning and knowledge representation methods (for solving real world problems).
	314454.04 (CO4)	Analyze the suitable techniques of NLP to develop AI applications.
	314454.05 (CO5)	Correlate the appropriate methods of Game Theory to design AI applications.
	314454.06 (CO6)	Understand the concept of deep learning and AI applications.
314454 (B): Elective-II (Cyber Security)	**314454.01 (CO1)**	To develop basic understanding of cyber security.
	314454.02 (CO2)	Differentiate among different types of cyber threats and cyber-crimes.
	314454.03 (CO3)	Illustrate cyber forensic techniques to identify the criminal activities.
	314454.04 (CO4)	Apply forensic analysis tools to recover important evidence for identifying computer crime.

	314454.05 (CO5)	Distinguish and classify the forms of cybercriminal activity and the technological and engineering methods used to undertake such crimes
	314454.06 (CO6)	Evaluate the effectiveness of cyber-security, cyber-laws and other countermeasures against cybercrime
314454 (C): Elective-II (Cloud Computing)	**314454.01 (CO1)**	Articulate the main concepts, key technologies and fundamentals of cloud computing.
	314454.02 (CO2)	Understand cloud enabling technologies and virtualization.
	314454.03 (CO3)	Analyze various cloud programming models and apply them to solve problems on the cloud.
	314454.04 (CO4)	Explain data storage and major security issues in the cloud.
	314454.05 (CO5)	Understand trends in ubiquitous cloud and internet of things.
	314454.06 (CO6)	Explore future trends of cloud computing.
314454 (D): Elective –II (Software Modeling and Design)	**314454.01 (CO1)**	Understand basics of object oriented methodologies and Unified Modeling Language (UML).
	314454.02 (CO2)	Understand and apply analysis process, use case modeling, domain/class modeling
	314454.03 (CO3)	Design and apply interaction and behavior modeling on a given system.
	314454.04 (CO4)	Comprehend OO design process and business, access and view layer class design.
	314454.05 (CO5)	Recognize the software design principles and patterns to be applied on system.
	314454.06 (CO6)	Get started on study of architectural design principles and guidelines in the various type of application development.
314455: Internship	**314455.01 (CO1)**	To develop professional competence through industry internship.
	314455.02 (CO2)	To apply academic knowledge in a personal and professional environment.
	314455.03 (CO3)	To build the professional network and expose students to future employees.
	314455.04 (CO4)	To Apply professional and societal ethics in their day to day life.
	314455.05 (CO5)	To become a responsible professional having social, economic and administrative considerations.
	314455.06 (CO6)	To make own career goals and personal aspirations.
314456: Computer Network Security Lab	**314456.01 (CO1)**	Design and configure small size network and associated networking commands.
	314456.02 (CO2)	Understand various client/server environments to use application layer protocols.
	314456.03 (CO3)	Use basic cryptographic techniques in software and system design.
	314456.04 (CO4)	Apply methods for authentication, access control, intrusion detection.
314457: DS & BDA Lab	**314457.01 (CO1)**	Apply Big data primitives and fundamentals for application development.
	314457.02 (CO2)	Explore different Big data processing techniques with use cases.
	314457.03 (CO3)	Apply the Analytical concept of Big data using Python.
	314457.04 (CO4)	Visualize the Big Data using Tableau.

	314457.05 (CO5)	Design algorithms and techniques for Big data analytics.
	314457.06 (CO6)	Design and develop Big data analytic application for emerging trends.
314458: Laboratory Practice-II (Web Application Development)	**314458.01 (CO1)**	Develop Static and Dynamic responsive website using technologies HTML, CSS, Bootstrap and AJAX.
	314458.02 (CO2)	Create Version Control Environment.
	314458.03 (CO3)	Develop an application using front end and backend technologies.
	314458.04 (CO4)	Develop mobile website using JQuery Mobile.
	314458.05 (CO5)	Deploy web application on cloud using AWS.
314458: Lab Practice – II (Artificial Intelligence)	**314458.01 (CO1) 314458.02 (CO2)**	Evaluate and apply core knowledge of AI on various real world problems. Illustrate and demonstrate AI tools for different dynamic applications.
314458: Lab Practice –II (Cyber Security)	**314458.01 (CO1)**	To know the different guidelines for Packet Sniffing in networking and internetworking environment.
	314458.02 (CO2)	To know the different types of cyber-attacks and will be able analyze the attacks.
	314458.03 (CO3)	Apply the knowledge of IDS to secure network and performing analysis of IDS attack on network.
314458: Laboratory Practice-II (Cloud Computing)	**314458.01 (CO1)**	To design and develop cloud based applications.
	314458.02 (CO2)	To Simulate a cloud scenario using Cloud Sim.
	314458.03 (CO3)	To design and deploy web applications in cloud environment.
314458: Laboratory Practice-II (Software Modeling Design)	**314458.01 (CO1)**	Develop use case model with the help of UML notations.
	314458.02 (CO2)	Develop and implement analysis model and design model.
	314458.03 (CO3)	Develop and implement Interaction and behavior Model.
Mandatory Audit Course 6 314459 (A) : Green and Unconventional Energy	**314459.01 (CO1)**	List and explain the main sources of energy and their primary applications in the India, and the world.
	314459.02 (CO2)	Describe the challenges and problems associated with the use of various energy sources and its conservation.
	314459.03 (CO3)	List and describe the primary renewable energy resources and technologies.
	314459.04 (CO4)	Collect and organize information on renewable energy technologies as a basis for further analysis and evaluation.
Mandatory Audit Course 6 314459 (B): Leadership and Personality Development	**314459.01 (CO1)**	Practice responsible decision-making and personal accountability.
	314459.02 (CO2)	Demonstrate an understanding of group dynamics and effective teamwork.
	314459.03 (CO3)	Develop a range of leadership skills and abilities such as effectively leading change, resolving conflict, and motivating others.
	314459.04 (CO4)	Develop multi-dimensional personality.
Mandatory Audit Course 6 314459 (C): Foreign Language- (Japanese Language- IV)	**314459.01 (CO1)**	Do Better Communication in Japanese language.
	314459.02 (CO2)	Demonstrate knowledge of Japanese Language Scripts (Reading, Writing, etc).
	314459.03 (CO3)	Demonstrate knowledge of Japanese culture, lifestyle, etc.
	314459.04 (CO4)	Pursue advanced Professional Japanese Language course.

BE (Semester-I) 2019 Pattern		
414441: Information Storage and Retrieval	**414441.01 (CO1)**	Understand the concept of Information retrieval and to apply clustering in information retrieval
	414441.02 (CO2)	Use an indexing approach for retrieval of text and multimedia data.
	414441.03 (CO3)	Evaluate performance of information retrieval systems.
	414441.04 (CO4)	Apply the concepts of multimedia and distributed information retrieval.
	414441.05 (CO5)	Use appropriate tools in analyzing the web information
	414441.06 (CO6)	Simulate the working of a search engine and recommender system
414442:Software Project Management	**414442.01 (CO1)**	Apply the practices and methods for successful Software Project Management
	414442.02 (CO2)	Create Design and Evaluate Project
	414442.03 (CO3)	Analyze Project Schedule and calculate Risk Management with help of tools
	414442.04 (CO4)	Demonstrate different tools used for Project Tracking, Monitoring & Control.
	414442.05 (CO5)	Identify Staff Selection Process and the issues related to Staff Management.
	414442.06 (CO6)	Discuss and use modern tools for Software Project Management.
414443: Deep Learning	**414443.01 (CO1)**	Understand the theoretical foundations, algorithms, and methodologies of Deep Learning.
	414443.02 (CO2)	Apply the concepts of Convolution Neural Networks and use of popular CNN architectures.
	414443.03 (CO3)	Compare Feed Forward Neural Network and Recurrent Neural Network and learn modeling the time dimension using RNN and LSTM.
	414443.04 (CO4)	Elaborate unsupervised deep learning algorithms like Auto encoders
	414443.05 (CO5)	Explore Representation Learning and Transfer Learning techniques using variants of CNN architecture
	414443.06 (CO6)	Evaluate the performance of deep learning algorithms and to provide solution for various real-world applications.
414444:Elective–III (Mobile Computing)	**414444.01 (CO1)**	Understand the basic concepts of mobile computing, MAC and different multiplexing techniques
	414444.02 (CO2)	Understand Protocols, Connection Establishment, Frequency Allocation, Routing of mobile telecommunication system like GSM, GPRS, UMTS.
	414444.03 (CO3)	Understand the Generations of Mobile Communication Technologies
	414444.04 (CO4)	Learn mobile IP , Adhoc – Network, Reactive Routing protocols, Multicast Routing.
	414444.05 (CO5)	Obtaining knowledge of transport layer protocol TCP, File System, and different application layer protocols.
	414444.06 (CO6)	Gain knowledge about different mobile platforms**,** operating Systems, Software Development Kit, Security Issues.
	414444.01 (CO1)	Understand concepts of parallel computing, its application areas and parallel computing platforms
	414444.02 (CO2)	Apply different Parallel programming paradigm and Decomposition Techniques

414444: Elective – III (High Performance Computing)	**414444.03 (CO3)**	Correlate various communication calls.
	414444.04 (CO4)	Analyze and Measure different Performance Metrics.
	414444.05 (CO5)	Perform CUDA Programming.
	414444.06 (CO6)	Build the logic to develop parallel algorithms for high performance computing.
414444: Elective – III (Multimedia Technology)	**414444.01 (CO1)**	Understand basic building block and applications of Multimedia
	414444.02 (CO2)	Solve and analyze different algorithms for text and image compression.
	414444.03 (CO3)	Classify different audio and video file formats of Multimedia.
	414444.04 (CO4)	Apply open-source authoring tools of animation
	414444.05 (CO5)	List various devices used in virtual reality and its use in daily life.
	414444.06 (CO6)	Recognize emerging trends in Multimedia
414444: Elective – III (Smart Computing)	**414444.01 (CO1)**	Demonstrate the knowledge of design of smart computing and its applications.
	414444.02 (CO2)	Describe different generations of mobile and mobile computing projects
	414444.03 (CO3)	Demonstrate the knowledge of design of Ubicomp and its applications
	414444.04 (CO4)	Explain smart devices and services used Ubicomp.
	414444.05 (CO5)	Implement interfacing of various sensors, actuators to the development boards
	414444.06 (CO6)	Compare various IoT communication technologies and smart computing applications
414445: Elective – IV (Bioinformatics)	**414445.01 (CO1)**	Integrate biological concepts with information technologies to study the biological system.
	414445.02 (CO2)	Study Gene structure, various biological database, and methods to manage the different types of biological data.
	414445.03 (CO3)	Describe principles and algorithms of pair wise and multiple alignments.
	414445.04 (CO4)	Study various bioinformatics tools and Algorithm.
	414445.05 (CO5)	Understand modeling and simulation in bioinformatics, drug discovery process. and Protein Structure.
	414445.06 (CO6)	To Gain awareness in field of System Biology and Human Disease.
414445: Elective – IV (Introduction to DevOps)	**414445.01 (CO1)**	Understand the fundamental concepts of DevOps
	414445.02 (CO2)	Link the background of DevOps with other technologies
	414445.03 (CO3)	Comprehend the concept of continuous integration and continuous delivery
	414445.04 (CO4)	Compare various stages of continuous deployment and test strategies
	414445.05 (CO5)	Justify the importance of monitoring system and reliability engineering
	414445.06 (CO6)	Use the latest tools in DevOps

	414445.01 (CO1)	Implement fundamental image processing techniques required for computer vision.
	414445.02 (CO2)	Apply feature extraction techniques.
	414445.03 (CO3)	Apply Hough Transform for line, circle, and ellipse detections.
	414445.04 (CO4)	Understand three-dimensional analysis techniques.
	414445.05 (CO5)	Develop skills to develop applications using computer vision techniques.
414445: Elective – IV (Wireless Communication)	**414445.01 (CO1)**	Articulate the fundamental concept of cellular system.
	414445.02 (CO2)	Analyze the fundamentals of cellular systems.
	414445.03 (CO3)	Illustrate multiple access technique for effective utilization of spectrum.
	414445.04 (CO4)	Design and analyze the WAP Programming Model in networking environment.
	414445.05 (CO5)	Learn and understand security issues, challenges and tools in wireless communication.
	414445.06 (CO6)	Explore the emerging trends and applications in wireless communication
414446: Lab Practice III	**414446.01 (CO1)**	Understand the concept of Information retrieval and to apply clustering in information retrieval.
	414446.02 (CO2)	Use appropriate indexing approach for retrieval of text Evaluate performance of information retrieval systems.
	414446.03 (CO3)	Apply appropriate tools in analyzing the web information.
	414446.04 (CO4)	Map the concepts of the subject on recent developments in the Information retrieval field.
414447: Lab Practice IV	**414447.01 (CO1)**	Learn and Use various Deep Learning tools and packages
	414447.02 (CO2)	Build and train a deep Neural Network models for use in various applications.
	414447.03 (CO3)	Apply Deep Learning techniques like CNN, RNN Auto encoders to solve real word Problems.
	414447.04 (CO4)	Evaluate the performance of the model build using Deep Learning
414448: Project Stage I	**414448.01 (CO1)**	To apply knowledge of mathematics, science, and engineering to formulate the Problem statement.
	414448.02 (CO2)	To design and conduct experiments, as well as to analyze and interpret data.
	414448.03 (CO3)	Understand the professional and ethical responsibility
	414448.04 (CO4)	To communicate effectively
	414448.05 (CO5)	Get broad education which is necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
	414448.06 (CO6)	Recognition of the need for, and an ability to engage in life-long learning
	414448.07 (CO7)	To use the techniques, skills, and modern engineering tools necessary for engineering practices
	414448.08 (CO8)	To design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

414449A: Audit Course 7 : Copyrights and Patents	**414449A.01 (CO1)**	Understand the concepts of Intellectual Property Rights.
	414449A.02 (CO2)	Understand the knowledge about Copyrights and Trademark.
	414449A.03 (CO3)	Understand the knowledge how to protect trade secrets.
414449B: Audit Course 7: Stress Management By Yoga	**414449A.01 (CO1)**	Understand the reasons for Stress**.**
	414449A.02 (CO2)	Understand the role of Yoga.
	414449A.03 (CO3)	Develop healthy mind in a healthy body
	414449A.04 (CO4)	Develop overall efficiency
414449C: Audit Course 7 English for Research Paper Writing	**414449A.01 (CO1)**	Understand that how to improve writing skills and level of readability.
	414449A.02 (CO2)	Identify and categorize about what to write in each section.
	414449A.03 (CO3)	Ensure the good quality of paper at very first-time submission.

BEIT 2019 Pattern Semster-II		
414450:Distributed Systems	**414450.01 (CO1)**	Demonstrate the core concepts of distributed systems.
	414450.02 (CO2)	Understand the concept of middleware of distributed systems.
	414450.03 (CO3)	Understand Inter-process communication methods and analyze different coordination algorithms.
	414450.04 (CO4)	Comprehend the importance of replication to achieve fault tolerance in distributed systems.
	414450.05 (CO5)	Analyze the design and functioning of existing distributed file systems, distributed multimedia, and distributed web-based systems
	414450.06 (CO6)	Understand various Recent Trends in distributed systems.
414451:Elective-V (Software Defined Network)	**414451.01 (CO1)**	Acquire fundamental knowledge of SDN exploring the need, characteristics, and architecture of SDN and methods of API's in SDN
	414451.02 (CO2)	Recognize Open Flow protocols and its forwarding, pipeline model and use cases of SDN controller.
	414451.03 (CO3)	Demonstrate virtualization and Cloud computing services of SDN.
	414451.04 (CO4)	Comprehend IT Infrastructure and understand the data center in SDN.
	414451.05 (CO5)	Analyze various security issues and challenges in SDN
	414451.06 (CO6)	Comprehend SDN application areas and future.
414451: Elective- V (Social Computing)	**414451.01 (CO1)**	Understand basics of Social Media Analytics
	414451.02 (CO2)	Correlate Network Measures for Social Media Data
	414451.03 (CO3)	Visualize mining in social media data
	414451.04 (CO4)	Discuss the Social Similarities
	414451.05 (CO5)	Interpret social media behavior
	414451.06 (CO6)	Apply Social Media Computations for Google+
414451: Elective V (Natural Language Processing)	**414451.01 (CO1)**	Understand and analyze the natural language text and model.
	414451.02 (CO2)	Analyze the natural language syntactically.
	414451.03 (CO3)	Analyze and study natural language logically.
	414451.04 (CO4)	Process the natural language text based on relations and knowledge.
	414451.05 (CO5)	Evaluate the natural language text using models and apply modeling techniques for automatic document separation and text mining.
	414451.06 (CO6)	Apply information retrieval techniques.
414451: Elective-V (Soft Computing)	**414451.01 (CO1)**	Learn soft computing techniques and their roles in problem solving.
	414451.02 (CO2)	Understand and Analyze various Artificial neural network techniques
	414451.03 (CO3)	Understand and define the fuzzy systems for problem solving

	414451.04 (CO4)	Understand and apply the concepts of genetic algorithms for problem solving.
	414451.05 (CO5)	Identify and select a suitable Soft Computing method to solve the problem
	414451.06 (CO6)	Identify and understand the role of soft computing models in various applications
414451: Elective V (Game Engineering)	**414451.01 (CO1)**	Describe fundamentals of game engineering and the social- ethical issues in game development.
	414451.02 (CO2)	Develop creative and critical thinking skills for designing compelling games.
	414451.03 (CO3)	Apply game mechanics to make game more enjoyable.
	414451.04 (CO4)	Analyze Games over Networks and Peer Effects.
	414451.05 (CO5)	Demonstrate an understanding of various tools that are used in game development.
	414451.06 (CO6)	Apply mathematical and game programming knowledge and skills to solve development tasks.
414452: Elective VI (Ethical Hacking and Security)	**414452.01 (CO1)**	Identify Ethical hacking processes and become acquainted with Penetration testing.
	414452.02 (CO2)	Recognize Foot printing techniques and apply in real time applications
	414452.03 (CO3)	Build knowledge about Meta sploit tool with Kali Linux
	414452.04 (CO4)	Differentiate Privilege Escalation in Windows and Linux
	414452.05 (CO5)	Construct Secure Web Applications to understand Hacking Techniques
	414452.06 (CO6)	Recognize Wifi Hacking and Security techniques
414452: Elective-VI (Augmented and Virtual Reality)	**414452.01 (CO1)**	Analyze how Virtual Reality systems work.
	414452.02 (CO2)	Understand the representation of Virtual world
	414452.03 (CO3)	Describe the importance of motion and tracking in VR systems.
	414452.04 (CO4)	Analyze how AR systems work and list the applications of AR
	414452.05 (CO5)	Identify the working of various AR components and AR devices.
	414452.06 (CO6)	Make use of computer vision concepts for AR
414452: Elective VI (Business Analytics and Intelligence)	**414452.01 (CO1)**	Apply conceptual knowledge on how Business Intelligence is used in decision making process
	414452.02 (CO2)	Use modeling concepts in Business Intelligence
	414452.03 (CO3)	Understand and apply the concepts of business reports and analytics with the help of visualization for business performance management
	414452.04 (CO4)	Comprehend the model-based decision making using prescriptive analytics
	414452.05 (CO5)	Analyze the role of analytics and intelligence in Business
	414452.06 (CO6)	Comprehend different Business Intelligence trends and its future impacts
	414452.01 (CO1)	Understand the concept of cryptography and decentralization
	414452.02 (CO2)	Acquire fundamental knowledge of blockchain with issues associated with it.

414452: Elective-VI (Blockchain Technology)	**414452.03 (CO3)**	Acquire knowledge of Ethereum blockchain platform.
	414452.04 (CO4)	Understand hyper ledger fabric platform
	414452.05 (CO5)	Acquire the knowledge regarding working of tokenization.
	414452.06 (CO6)	Describe the applications and risk involved
414453: Startup and Entrepreneurship	**414453.01 (CO1)**	Able to understand key concepts and framework of innovation and start-up ecosystem.
	414453.02 (CO2)	Gain knowledge of how to develop start up ecosystem, its key components and how to influence and manage dynamics between them and increase the productivity of ecosystem.
	414453.03 (CO3)	Understand the role of different stakeholders in ecosystem in building and supporting growth of start-ups.
	414453.04 (CO4)	Have insight into global trend in start-up ecosystem and product development.
	414453.05 (CO5)	Mapping different start-up ecosystems and developing performance indicators
414454: Lab Practice - V	**414454.01 (CO1)**	Demonstrate knowledge of the core concepts and techniques in distributed systems
	414454.02 (CO2)	Learn how to apply principles of state-of-the-Art Distributed systems in practical application.
	414454.03 (CO3)	Design, build and test application programs on distributed systems
414455: Lab Practice VI (Ethical Hacking and Security)	**414455.01 (CO1)**	Perform internal and external vulnerability analysis on web application and network.
	414455.02 (CO2)	Comprehend the hacker's mindset while conducting reconnaissance and system hacking.
	414455.03 (CO3)	Implement industry standard security protocols to prevent cyber-attacks.
	414455.04 (CO4)	Carry-out the same tactics, techniques, and procedures as actual hackers
414455: Lab Practice VI (Business Analytics and Intelligence)	**414455.01 (CO1)**	Compare and analyze different analytical tools used by businesses
	414455.02 (CO2)	Understand the application of critical notion of KPI using real time case studies
	414455.03 (CO3)	Design and implement the analytical models using suitable tools
	414455.04 (CO4)	Create visualizations using suitable tools
414455: Lab Practice VI (Blockchain Technology)	**414455.01 (CO1) 414455.02 (CO2)**	To implement small blockchain experimentations. Identify Consensus mechanism for Blockchain Application
414456 : Project-II	**414456.01 (CO1)**	To apply engineering and mathematical knowledge to investigate / select proper technology / Algorithm suitable to solve the problem in hand
	414456.02 (CO2)	To apply knowledge of statistics for analysis of results and express conclusion and justification for the same.
	414456.03 (CO3)	To design and conduct experiments, as well as to analyze and interpret data or develop prototype model of the application
	414456.04 (CO4)	To communicate effectively.
	414456.05 (CO5)	Get broad education which is necessary to understand the impact of engineering solutions in a global, economic, environmental, ethically and societal context
	414456.06 (CO6)	Recognition of the need for, and an ability to engage in life-long learning.

414457A: Audit Course 8 Functional Programming in Haskell	**414457A.01 (CO1)**	Understand the correctness of programs
	414457A.02 (CO2)	Make use of higher-order functions.
	414457A.03 (CO3)	Make use of the data encapsulation and parametric polymorphism for functional programming
	414457A.04 (CO4)	Understand the importance of the 'type checking' of values/functions to develop programs relatively faster.
414457B: Audit Course 8 : Cyber Laws And Use Of Social Media	**414457B.01 (CO1)**	Understand the importance of IT Act.
	414457B.02 (CO2)	Understand the significance of cyber laws and its practices.
	414457B.03 (CO3)	Identify and Analyze software vulnerabilities and security solutions to reduce the risk of exploitation
	414457B.04 (CO4)	To study various privacy and security concerns of Online social media.
414457C: Audit Course 8 Constitution Of India	**414457C.01 (CO1)**	Understand the Principles of the Indian Constitution
	414457C.02 (CO2)	Understand and identify the growth of the demand for civil rights in India
	414457C.03 (CO3)	Understand the organizations of governance.
	414457C.04 (CO4)	Understand the role and functions of local administration.