**Course outcomes for R19 Regulation**

**I-B.TECH. I-SEM**

**(C101) Algebra and Calculus**

**COURSE OUTCOMES:**

1. develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
2. Utilize mean value theorems to real life problems (L3)
3. familiarize with functions of several variables which is useful in optimization (L3)
4. Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems (L5)
5. Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

**(C102) Chemistry**

**COURSE OUTCOMES:**

1. Compare the materials of construction for battery and electrochemical sensors (L2)
2. Explain the preparation, properties, and applications of thermoplastics &thermos settings, elastomers & conducting polymers. (L2)
3. explain the principles of spectrometry, GC and HPLC in separation of gaseous and liquid mixtures (L2)
4. apply the principle of supramolecular chemistry in application of molecular machines and switches (L3)

**(C103) Problem Solving & Programming**

**COURSE OUTCOMES:**

1. Construct his own computer using parts (L6).
2. Recognize the importance of programming language independent constructs (L2)
3. Solve computational problems (L3)
4. Select the features of C language appropriate for solving a problem (L4)
5. Design computer programs for real world problems (L6) & Organize the data which is more appropriated for solving a problem (L6)

**(C104) Engineering Graphics Lab**

**COURSE OUTCOMES:**

1. Draw various curves applied in engineering. (L2)
2. Show projections of solids and sections graphically. (L2)
3. Draw the development of surfaces of solids. (L3)
4. Use computers as a drafting tool. (L2)
5. Draw isometric and orthographic drawings using CAD packages. (L3)

**(C105) Engineering Workshop**

**COURSE OUTCOMES:**

1. Apply wood working skills in real world applications. (l3)
2. Build different parts with metal sheets in real world applications. (l3)
3. Apply fitting operations in various applications. (l3)
4. Apply different types of basic electric circuit connections. (l3)
5. Demonstrate soldering and brazing. (l2)

**(C106) Chemistry Lab**

**COURSE OUTCOMES:**

1. Determine the cell constant and conductance of solutions (L3)
2. Prepare advanced polymer materials (L2)
3. Measure the strength of an acid present in secondary batteries (L3)
4. Analyse the IR and NMR of some organic compounds (L3)

**(C107) Problem Solving & Programming Lab**

**COURSE OUTCOMES:**

1. Construct a computer given its parts (L6)
2. Select the right control structure for solving the problem (L6)
3. Analyze different sorting algorithms (L4)
4. Design solutions for computational problems (L6)
5. Develop C programs which utilize the memory efficiently using programming constructs like pointers.

**I-B.TECH. II-SEM**

**(C108) Basic Electrical and Electronics Engineering**

**COURSE OUTCOMES:**

1. Apply concepts of KVL/KCL in solving DC circuits (L3)
2. Choose correct rating of a transformer for a specific application (L5)
3. Illustrate working principles of induction motor - DC Motor (L3)
4. Identify type of electrical machine based on their operation. (L1)
5. Describe working principles of protection devices used in electrical circuits. (L2)

**(C109) Probability and Statistics**

**COURSE OUTCOMES:**

1. Make use of the concepts of probability and their applications (L3)
2. Apply discrete and continuous probability distributions (L3)
3. Classify the concepts of data science and its importance (L4)
4. Interpret the association of characteristics and through correlation and regression tools (L4)
5. Design the components of a classical hypothesis test infer the statistical inferential methods based on small and large sampling tests (L6)

**(C110) Applied Physics**

**COURSE OUTCOMES:**

1. Identify the wave properties of light and the interaction of energy with the matter (L3)
2. Apply electromagnetic wave propagation in different guided media (L2)
3. Asses the electromagnetic wave propagation and its power in different media (L5)
4. Calculate conductivity of semiconductors (L3)
5. Interpret the difference between normal conductor and superconductor & demonstrate the application of nanomaterials (L2)

**(C111) Data Structures**

**COURSE OUTCOMES:**

1. Select Appropriate Data Structure for solving a real-world problem (L4)
2. Select appropriate file organization technique depending on the processing to be done (L4)
3. Construct Indexes for Databases (L6)
4. Analyse the Algorithms (L4)
5. Develop Algorithm for Sorting large files of data (L3)

**(C112) Communicative English - I**

**COURSE OUTCOMES:**

1. Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
2. Apply grammatical structures to formulate sentences and correct word forms
3. Analyze discourse markers to speak clearly on a specific topic in informal discussions
4. Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
5. Create a coherent paragraph interpreting a figure/graph/chart/table

**(C113) Computer Science and Engineering Workshop**

**COURSE OUTCOMES:**

1. Construct a computer from its parts and prepare it for use.
2. Develop Documents using Word processors.
3. Develop presentations using the presentation tool.
4. Perform computations using spreadsheet tool.
5. Connect computer using wired and wireless connections & Design Graphics, Videos and Web pages and Connect things to computers.

**(C114) Communicative English - I Lab**

**COURSE OUTCOMES:**

1. To remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
2. To apply communication skills through various language learning activities
3. To analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
4. To evaluate and exhibit acceptable etiquette essential in social and professional settings
5. To create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

**(C115) Basic Electrical & Electronics Engineering Lab**

**COURSE OUTCOMES:**

1. Describe construction, working and characteristics of diodes, transistors and operational amplifiers (L2)
2. Demonstrate how electronic devices are used for applications such as rectification, switching and amplification (L2)
3. Build different building blocks in digital electronics using logic gates (L3)
4. Explain functionality of flip-flops, shift registers and counters for data processing applications (L2)
5. Explain functioning of various communication systems (L2)

**(C116) Applied Physics Lab**

**COURSE OUTCOMES:**

1. Operate optical instruments like microscope and spectrometer (L2)
2. Determine thickness of a hair/paper with the concept of interference & estimate the wavelength of different colors using diffraction grating and resolving power (L2)
3. Plot the intensity of the magnetic field of circular coil carrying current with distance & evaluate the acceptance angle of an optical fiber and numerical aperture (L3)
4. Determine magnetic susceptibility of the material and its losses by B-H curve Determine the resistivity of the given semiconductor using four probe method (L3)
5. Identify the type of semiconductor i.e., n-type or p-type using hall effect & calculate the band gap of a given semiconductor (L3)

**(C117) Data Structures lab**

**COURSE OUTCOMES:**

1. Select the data structure appropriate for solving the problem (L5)
2. Implement searching and sorting algorithms (L3)
3. Design new data types (L6)
4. Illustrate the working of stack and queue (L4)
5. Organize the data in the form of files (L6)

**II-B.TECH. I-SEM**

**(C201) Mathematical Foundations of Computer Science**

**COURSE OUTCOMES:**

1. Evaluate elementary mathematical arguments and identify fallacious reasoning (L5).
2. Understand the properties of Compatibility, Equivalence and Partial Ordering relations, Lattices and Has see Diagrams & Understand the general properties of Algebric Systems, Semi Groups, Monoids and Groups (L1).
3. Design solutions for problems using breadth first and depth first search techniques (L6)
4. Solve the homogeneous and non-homogeneous recurrence relations (L3).
5. Apply the concepts of functions to identify the Isomorphic Graphs & Identify Euler Graphs, Hamilton Graph and Chromatic Number of a graph (L2).

**(C202) Digital Logic Design**

**COURSE OUTCOMES:**

1. Analyze the number systems and codes.
2. Decide the Boolean expressions using Minimization methods.
3. Design the sequential and combinational circuits.
4. Apply state reduction methods to solve sequential circuits.
5. Describe various types of memories.

**(C203) Design Thinking**

**COURSE OUTCOMES:**

1. Generate and develop different design ideas
2. Appreciate the innovation and benefits of design thinking
3. To bring awareness on idea generation
4. Experience the design thinking process in IT and agile software development
5. Understand design techniques related to related to variety of software services

**(C204) Database Management Systems**

**COURSE OUTCOMES:**

1. Design a database for a real-world information system
2. Define transactions which preserve the integrity of the database
3. Generate tables for a database
4. Organize the data to prevent redundancy
5. Pose queries to retrieve the information from database.

**(C205) Object Oriented Programming Through Java**

**COURSE OUTCOMES:**

1. To solve real world problems using OOP Techniques
2. To apply code reusability through inheritance, packages and interfaces
3. To solve problems using java collection framework and I/O classes.
4. To develop applications by using parallel streams for better performance & to develop applets for web applications.
5. To build GUIs and handle events generated by user interactions & to use the JDBC API to access database.

**(C206) Python Programming**

**COURSE OUTCOMES:**

1. Solve the problems by applying modularity principle.
2. Apply the features of Python language in various real applications.
3. Select appropriate data structure of Python for solving a problem.
4. Design object-oriented programs using Python for solving real-world problems.
5. Apply modularity to programs.

**(C207) Universal Human Values**

**COURSE OUTCOMES:**

1. Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
2. They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
3. They would have better critical ability.
4. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
5. It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

**(C208) Database Management Systems Laboratory**

**COURSE OUTCOMES:**

1. Design database for any real-world problem
2. Implement PL/SQL programs
3. Define SQL queries
4. Decide the constraints
5. Investigate for data inconsistency

**(C209) Object Oriented Programming Through Java Lab**

**COURSE OUTCOMES:**

1. Recognize the Java programming environment.
2. Develop efficient programs using multithreading
3. Design reliable programs using Java exception handling features.
4. Extend the programming functionality supported by Java.
5. Select appropriate programming construct to solve a problem.

**(C210) Python Programming Lab**

**COURSE OUTCOMES:**

1. Design solutions to mathematical problems.
2. Organize the data for solving the problem.
3. Develop Python programs for numerical and text-based problems.
4. Select appropriate programming construct for solving the problem.
5. Illustrate object-oriented concepts.

**II-B.TECH. II-SEM**

**(C212) NUMBER THEORY AND APPLICATIONS**

**COURSE OUTCOMES:**

1. Understand number theory and its properties.
2. Understand principles on congruences
3. Develop the knowledge to apply various applications
4. Understand the terminology of finite fields. & Understand rho method and Fermat factorization.
5. Develop various encryption methods and its applications

**(C213) COMPUTER ORGANIZATION**

**COURSE OUTCOMES:**

1. Understand computer architecture concepts related to design of modern processors, memories and I/Os
2. Identify the hardware requirements for cache memory and virtual memory
3. Design algorithms to exploit pipelining and multiprocessors
4. Understand the importance and tradeoffs of different types of memories.
5. Identify pipeline hazards and possible solutions to those hazards

**(C214) Design And Analysis Of Algorithms**

**COURSE OUTCOMES:**

1. Determine the time complexity of an algorithm by solving the corresponding recurrence equation
2. Apply the Divide and Conquer strategy to solve searching, sorting and matrix multiplication problems.
3. Analyze the efficiency of Greedy and Dynamic Programming design techniques to solve the optimization problems.
4. Apply Backtracking technique for solving constraint satisfaction problems.
5. Analyze the LC and FIFO branch and bound solutions for optimization problems, and compare the time complexities with Dynamic Programming techniques & Define and classify deterministic and non-deterministic algorithms; P, NP, NP –hard and NP-complete classes of problems.

**(C215) Entrepreneurship**

**COURSE OUTCOMES:**

1. Design business model and business plan
2. Demonstrate the Venture Infront of investors
3. Build the team for a start-up
4. Illustrate successful cases of start-ups
5. Develop strategies for market survey

**(C216) OPERATING SYSTEMS**

**COURSE OUTCOMES:**

1. Realize how applications interact with the operating system & Analyze the functioning of a kernel in an Operating system
2. Summarize resource management in operating systems & Analyze various scheduling algorithms
3. Examine concurrency mechanism in Operating Systems & Apply memory management techniques in design of operating systems
4. Understand the functionality of file system & compare and contrast memory management techniques.
5. Understand the deadlock prevention and avoidance & perform administrative tasks on Linux based systems.

**(C217) SOFTWARE ENGINEERING**

**COURSE OUTCOMES:**

1. Obtain basic software life cycle activity skills.
2. Design software requirements specification for given problems
3. Implement structure, object-oriented analysis and design for given problems
4. Design test cases for given problems
5. Apply quality management concepts at the application level

**(C218) OPERATING SYSTEMS LAB**

**COURSE OUTCOMES:**

1. Trace different CPU Scheduling algorithm (L2).
2. Implement Bankers Algorithms to Avoid and prevent the Dead Lock (L3).
3. Evaluate Page replacement algorithms (L5).
4. Illustrate the file organization techniques (L4).
5. Illustrate shared memory process (L4) & Design new scheduling algorithms (L6)

**(C219) Software Engineering Lab**

**COURSE OUTCOMES:**

1. Acquaint with historical and modern software methodologies
2. Understand the phases of software projects and practice the activities of each phase
3. Practice clean coding
4. Take part in project management
5. Adopt skills such as distributed version control, unit testing, integration testing, build management, and deployment

**III-B.TECH. I-SEM**

**(C301) FORMAL LANGUAGES AND AUTOMATA THEORY**

**COURSE OUTCOMES:**

1. Explain formal machines, languages and computations (L2)
2. Design finite state machines for acceptance of strings (L6)
3. Develop context free grammars for formal languages (L3)
4. Build pushdown automata for context free grammars (L3)
5. Apply Turing machine for solving problems (L3) & Validate decidability and undecidability (L6)

**(C302) ARTIFICIAL INTELLIGENCE**

**COURSE OUTCOMES:**

1. Apply searching techniques for solving a problem (L3)
2. Design Intelligent Agents (L6)
3. Develop Natural Language Interface for Machines (L6)
4. Design mini robots (L6)
5. Summarize past, present and future of Artificial Intelligence (L5)

**(C303) Object-Oriented Analysis Design And Testing**

**COURSE OUTCOMES:**

1. Analyze the problem from object-oriented perspective (L4)
2. Model complex systems using UML Diagrams (L3)
3. Choose the suitable design patterns in software design (L5)
4. Adapt Object-Oriented Design Principles (L6)
5. Identify the challenges in testing object-oriented software. (L3)

**(C304) Computer Networks**

**COURSE OUTCOMES:**

1. Identify the software and hardware components of a Computer network (L3)
2. Develop new routing, and congestion control algorithms (L3)
3. Assess critically the existing routing protocols (L5)
4. Explain the functionality of each layer of a computer network (L2)
5. Choose the appropriate transport protocol based on the application requirements (L3)

**(C305) Web Technologies**

**COURSE OUTCOMES:**

1. Construct a basic website using HTML and Cascading Style Sheets. (L3)
2. Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms. (L6)
3. Develop server side programs using Servlets and JSP. (L3)
4. Construct simple web pages in PHP and represent data in XML format. (L6)
5. Utilize AJAX and web services to develop interactive web applications. (L3)

**(C306) Technical Communication and Presentation Skills**

**COURSE OUTCOMES:**

1. Understand the importance of effective technical communication
2. Apply the knowledge of basic skills to become good orators
3. Analyze non-verbal language suitable to different situations in professional life
4. Evaluate different kinds of methods used for effective presentations
5. Create trust among people and develop employability skills

**(C307) Artificial Intelligence Laboratory**

**COURSE OUTCOMES:**

1. Explore the methods of implementing algorithms using artificial intelligence techniques
2. Illustrate search (informed) algorithms
3. Illustrate search (uninformed) algorithm
4. Demonstrate building of intelligent agents
5. Developing personal virutal assistants

**(C308) Computer Networks Laboratory**

**COURSE OUTCOMES:**

1. Design scripts for Wired network simulation (L6)
2. Design scripts of static and mobile wireless networks simulation (L6)
3. Analyze the data traffic using tools (L4)
4. Design JAVA programs for client-server communication (L6)
5. Construct a wired and wireless networks using the real hardware (L3)

**(C309) Object Oriented Analysis Design & Testing Lab**

**COURSE OUTCOMES:**

1. Design use case, sequence and collaboration diagrams.
2. Develop the different models to document an Object-oriented design.
3. Demonstrate class level and system integration testing
4. Adapt Object-Oriented Design Principles
5. Identify The Challenges In Testing Object-Oriented Software

**III-B.TECH. II-SEM**

**(C311) Cryptography & Network Security**

**COURSE OUTCOMES:**

1. Identify various type of vulnerabilities of a computer network (L2)
2. Outline various security algorithms (L4)
3. Design secure systems (L6)
4. Investigate the threats and identify the solutions for threats (L4)
5. Design secure electronic transactions

**(C312) Big Data Analytics**

**COURSE OUTCOMES:**

1. Explain the concepts and challenges of big data (L2)
2. Determine why existing technologies are inadequate to analyze the large data. (L5)
3. Outline the operations viz. Collect, manage, store, query, and analyze various forms of big data. (L2)
4. Apply large-scale analytic tools to solve some of the open big data problems. (L3)
5. Analyze the impact of big data for business decisions and strategies.(L4) Design different big data applications. (L6)

**(C313) English Communication**

**COURSE OUTCOMES:**

1. Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
2. Apply grammatical structures to formulate sentences and correct word forms
3. Analyze discourse markers to speak clearly on a specific topic in informal discussions
4. Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
5. Create a coherent paragraph interpreting a figure/graph/chart/table

**(C314) Compiler Design**

**COURSE OUTCOMES:**

1. Differentiate the various phases of a compiler (L4).
2. Identify the tokens and verify the code (L4)
3. Design code generator (L6)
4. Apply code optimization techniques (L3)
5. Design a compiler for a small programming language (L6)

**(C315) Soft Skills**

**COURSE OUTCOMES:**

1. Recognize the importance of verbal and non verbal skills
2. Develop the interpersonal and intrapersonal skills
3. Apply the knowledge in setting the SMART goals and achieve the set goals
4. Analyze difficult situations and solve the problems in stress-free environment
5. Create trust among people and develop employability skills

**(C316) Managerial Economics and Financial Analysis**

**COURSE OUTCOMES:**

1. Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
2. Apply concepts of production, cost and revenues for effective business decisions
3. Students can analyze how to invest their capital and maximize returns
4. Evaluate the capital budgeting techniques
5. Prepare the accounting statements and evaluate the financial performance of business entity.

**(C317) Big Data Analytics Laboratory**

**COURSE OUTCOMES:**

1. Configure Hadoop and perform File Management Tasks (L2)
2. Apply MapReduce programs to real time issues like word count, weather dataset and sales of a company (L3)
3. Critically analyze huge data set using Hadoop distributed file systems and MapReduce (L5)
4. Apply different data processing tools like Pig, Hive and Spark.(L6)
5. Apply different data processing tools like HiveQL, Spark.(L6)

**(C318) English Communication lab**

**COURSE OUTCOMES:**

1. Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
2. Apply communication skills through various language learning activities
3. Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
4. Evaluate and exhibit acceptable etiquette essential in social and professional settings
5. Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

**IV-B.TECH. I-SEM**

**(C401) Internet of Things**

**COURSE OUTCOMES:**

1. Choose the sensors and actuators for an IoT application (L1)
2. Select protocols for a specific IoT application (L2)
3. Utilize the cloud platform and APIs for IoT applications (L3)
4. Experiment with embedded boards for creating IoT prototypes (L3)
5. Design a solution for a given IoT application (L6)

**(C402) Software Testing**

**COURSE OUTCOMES:**

1. Choose Test cases that are geared to discover the program defects (L5)
2. Design test cases before writing code and run these tests automatically (L6)
3. Formulate test cases for testing different programming constructs.(L6)
4. Test the applications using different testing methods and automation tools.(L3)
5. Formatting regular expressions for control flow graphs by matrix.

**(C403) Natural Language Processing**

**COURSE OUTCOMES:**

1. Build NLP applications using Python. (L6)
2. Apply various Parsing techniques, Bayes Rule, Shannon game, Entropy and Cross Entropy. (L3)
3. Explain the fundamentals of CFG and parsers and mechanisms in ATN’s. (L2)
4. Apply Semantic Interpretation and Language Modeling.(L3)
5. Interpret Machine Translation and multilingual Information Retrieval systems and Automatic Summarization.(L2)

**(C404) AIR POLLUTION AND CONTROL**

**COURSE OUTCOMES:**

1. Identify the sources of air pollution
2. Understand the composition and structure and structure of atmosphere.
3. Know about the general characteristics of stack emissions and their behavior
4. Know about the general characteristics of stake emission and their behavior
5. Know about the noise sources, mapping, prediction equations etc.,

**(C405) Management Science**

**OUTCOMES:**

1. Understand the concepts & principles of management and designs of organization in a practical world
2. Apply the knowledge of Work-study principles & Quality Control techniques in industry
3. Analyze the concepts of HRM in Recruitment, Selection and Training & Development.
4. Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business through SWOT.
5. Create Modern technology in management science.

**(C406) Internet of Things Lab**

**OUTCOMES:**

1. Choose the sensors and actuators for an IoT application (L1)
2. Select protocols for a specific IoT application (L2)
3. Utilize the cloud platform and APIs for IoT application (L3)
4. Experiment with embedded boards for creating IoT prototypes (L3)
5. Design a solution for a given IoT application (L6)

**(C407) Software Testing Lab**

**OUTCOMES:**

1. Demonstrate the basic testing procedures.(L2)
2. formulate test cases and test suites (L6)
3. Make use of the Selenium and Bugzilla tools to perform testing (L3)
4. Construct and test simple programs. (L6)
5. Demonstrate bug tracking (L2)

**(C408) Industrial Training/Skill Development/Research Project**

**COURSE OUTCOMES:**

1. Spell for basic concepts of science and technology
2. "Contrast the understanding perceptive of techniques applicable to their domain"
3. To improve familiarity with a variety of technical writings.
4. Improve their Presentation and Communication skills.
5. Make up them to pursue their placements and higher studies.

**IV-B.TECH. II-SEM**

**(C408) DevOps**

**OUTCOMES:**

1. Explain how DevOps will balance the needs throughout the SDLC(L2)
2. Demonstrate how DevOps improves the collaboration and productivity by automation. (L2)
3. AdaptDevOps in real time projects. (L6)
4. Illustrate the continuous integration tools and monitoring tools (L2)
5. Identify the Key factors of Maturity Model & Estimate the Devops Maturity Assessment(L6)

**(C409) Principles of Cellular and Mobile Communications:**

**OUTCOMES:**

1. Understand the concepts and operation of cellular systems (L1)
2. Apply the concepts of cellular systems to solve engineering problems (L2).
3. Analyse cellular systems for meaningful conclusions, Evaluate suitability of a cellular system in real time applications (L3).
4. Design cellular patterns based on frequency reuse factor (L4).
5. Evaluate suitability of a cellular system in real time applications (L4).

**(C410) Project Work**

**OUTCOMES:**

1. Identify the problem by applying acquired knowledge.
2. Analyze and categorize executable project modules after considering risks.
3. Choose efficient tools for designing project modules.
4. Combine all the modules through effective team work after efficient testing.
5. Elaborate the completed task and compile the project report.