**Course Outcomes for R20-Regulation**

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

**(C101) Linear 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(L4)

**(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 &thermosetting,

 elastomers& conducting polymers. (l2)

1. Explain the principles of spectrometry, slc in separation of solid and liquid mixtures (l2)
2. Apply the principle of Band diagrams in application of conductors and semiconductors (L3)

**(C103) C-Programming & Data Structures**

**COURSE OUTCOMES:**

1. Analyse the basicconcepts of C Programming language. (L4)

2. Design applications in C, using functions, arrays, pointers and structures. (L6)

3. Apply the concepts of Stacks and Queues in solving the problems. (L3)

4. Explore various operations on Linked lists. (L5)

5. Demonstrate various tree traversals and graph traversal techniques. (L2)

6. Design searching and sorting methods (L3)

**(C104) Basic Electrical & Electronics Engineering**

**COURSE OUTCOMES:**

1. Apply concepts of KVL/KCL in solving DC/AC circuits
2. Illustrate and Identify type of electrical machine based on their operation
3. Understand the basics of Power generation, Transmission and Distribution
4. Explain the theory, construction, and operation of electronic devices and Apply the concept of science and mathematics to explain applications of diodes.
5. Distinguish features of different active devices including Microprocessors

**(C105) Engineering Workshop**

**COURSE OUTCOMES:**

1. Apply wood working skills in real world applications
2. Build different parts with metal sheets in real world applications
3. Apply fitting operations in various applications
4. Apply different types of basic electric circuit connection
5. Demonstrate soldering and brazing & Repair the punctured tire of a bicycle

**(C106) IT Workshop**

**COURSE OUTCOMES:**

1. Disassemble and Assemble a Personal Computer and prepare the computer ready to use
2. Prepare the document using MS word,latex and prepare spread sheet for calculations using Excel and also the documents using LAteX.
3. Prepare Slide presentation using the presentation tool.
4. Interconnect two or more computers for information sharing
5. Access the internet and browse it to obtain the required information.

**(C107) Chemistry Lab**

**COURSE OUTCOMES:**

1. Determine the cell constant and conductance of solutions (L3)

2. Prepare advanced polymer Bakelite materials (L2)

3. Measure the strength of an acid present in secondary batteries (L3)

4. Analyze the IR of some organic compounds (L3)

**(C108) C-Programming & Data Structures Lab**

**COURSE OUTCOMES:**

1. Demonstrate basic concepts of C programming language. (L2)
2. Develop C programs using functions, arrays, structures and pointers. (L6)
3. Illustrate the concepts Stacks and Queues. (L2)
4. Design operations on Linked lists. (L6)
5. Apply various Binary tree traversal techniques. (L3)
6. Develop searching and sorting methods. (L6)

**(C109) Basic Electrical & Electronics Engineering Lab**

**COURSE OUTCOMES:**

1. Understand Kirchoff’s Laws & Superposition theorem &
2. Analyze the various characteristics on DC and AC Machines by conducting various tests.
3. Analyze I – V Characteristics of PV Cell
4. "Learn the characteristics of basic electronic devices like PN junction diode, Zener diode & BJT"
5. Analyze the application of diode as rectifiers, clippers and clampers and other circuits And Design simple electronic circuits and verify its functioning.

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

**(C110) Probability & 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 (L6) & Infer the statistical inferential methods based on small and large sampling tests (L6)

**(C111) Applied Physics**

**COURSE OUTCOMES:**

1. Study the different realms of physics and their applications through physical optics.
2. Study the concepts of lasers and asses the electromagnetic wave propagation and its power in different media.
3. Understands the response of dielectric and magnetic materials to the applied electric and magnetic fields.
4. Study the quantum mechanical picture of subatomic world and behaviour of electron by free electron theory and band theory.
5. Elaborate the physical properties exhibited by materials through the understanding of properties of semiconductors and superconductors.

**(C112) Communicative English:**

**COURSE OUTCOMES:**

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

**(C113) Python Programming & Data Science**

**COURSE OUTCOMES:**

1. Apply the features of Python language in various real applications. (L3)

2. Identify the appropriate data structure of Python for solving a problem (L2)

3. Demonstrate data analysis, manipulation and visualization of data using Python libraries(L5)

4. Enumerate machine learning algorithms. (L1)

5. Analyze the various applications of Data Science (L4) &Design solutions for real-world problems using Python. (L6)

**(C114) Engineering Drawing**

**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. Classify different sectional views of regular solids, obtain the true shapes of the sections of prisms, cylinder, pyramid and cone.
5. Understand the meaning of development of surfaces and draw the development of regular solids such as prism, cylinder, pyramid and cone.

**(C115) Engineering Graphics Lab**

**COURSE OUTCOMES:**

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

**(C116) Communicative English Lab:**

**COURSE OUTCOMES:**

1. Listening and repeating the sounds of English Language
2. Understand the different aspects of the English language and proficiency with emphasis on LSRW skills
3. Apply communication skills through various language learning activities
4. Analyze the English speech sounds, stress, rhythm, intonation and syllable.
5. Division for better listening and speaking comprehension.

**(C117) 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 (L2)
3. Estimate the wavelength of different colors using diffraction grating and resolving power (L2) & Plot the intensity of the magnetic field of circular coil carrying current with distance (L3)
4. Evaluate the acceptance angle of an optical fiber and numerical aperture (L3)
5. Determine the resistivity of the given semiconductor using four probe method (L3)
6. Identify the type of semiconductor i.e., n-type or p-type using hall effect (L3) & Calculate the band gap of a given semiconductor (L3)

**(C118) Python Programming & Data Science Lab**

**COURSE OUTCOMES:**

1. Illustrate the use of various data structures. (L3)
2. Analyze and manipulate Data using Pandas (L4)
3. Creating static, animated, and interactive visualizations using Matplotlib. (L6)
4. Understand the implementation procedures for the machine learning algorithms. (L2)
5. Apply appropriate data sets to the Machine Learning algorithms (L3)
6. Identify and apply Machine Learning algorithms to solve real-world problems (L1)

**(C119) 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.

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

**(C201) Discrete Mathematics & Graph Theory**

**COURSE OUTCOMES:**

1. Apply mathematical logic to solve problems.
2. Understand the concepts and perform the operations related to sets, relations and functions.
3. Gain the conceptual background needed and identify structures of algebraic nature.
4. Apply basic counting techniques to solve combinatorial problems & Formulate problems and solve recurrence relations.
5. Apply Graph Theory in solving computer science problems

**(C202) Digital Electronics& Microprocessors**

**COURSE OUTCOMES:**

1. Design any Logic circuit using basic concepts of Boolean Algebra.
2. Design any Logic circuit using basic concepts of PLDs.
3. Design any Logic circuit using basic concepts of Sequential Logic Circuits.
4. Design and develop any application using 8086 Microprocessor.
5. Design and develop any application using 8051 Microcontroller.

**(C203) Advanced Data Structures & Algorithms**

**COURSE OUTCOMES:**

1. Analyze the complexity of algorithms and apply asymptotic notations
2. Apply non-linear data structures and their operations.
3. Understand and apply greedy, divide and conquer algorithms.
4. Develop dynamic programming algorithms for various real-time applications.
5. Illustrate Backtracking algorithms for various applications.

**(C204) Object Oriented Programming Through Java**

**COURSE OUTCOMES:**

1. Solve real-world problems using OOP techniques.
2. Apply code reusability through inheritance, packages and interfaces
3. Solve problems using java collection framework and I/O classes.
4. Develop applications by using parallel streams for better performance & Develop applets for web applications.
5. Build GUIs and handle events generated by user interactions & Use the JDBC API to access the database

**(C205) Computer Organization**

**COURSE OUTCOMES:**

1. Understand computer architecture concepts related to the 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 trade-offs of different types of memories.
5. Identify pipeline hazards and possible solutions to those hazards.

**(C206) Digital Electronics& Microprocessors Lab**

**COURSE OUTCOMES:**

1. Design any Logic circuit using basic concepts of Boolean Algebra.
2. Design any Logic circuit using basic concepts of PLDs.
3. Design and develop any application using 8086 Microprocessor.
4. Design and develop any application using 8051 Microcontroller.

**(C207) Advanced Data Structures and Algorithms Lab**

**COURSE OUTCOMES:**

1. Understand and apply data structure operations.
2. Understand and apply non-linear data structure operations.
3. Apply Greedy, divide and conquer algorithms.
4. Develop dynamic programming algorithms for various real-time applications.
5. Illustrate and apply backtracking algorithms, further able to understand non-deterministic algorithms.

**(C208) 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 constructs to solve a problem.

**(C209) Web Application Development Lab**

**COURSE OUTCOMES:**

1. Construct web sites with valid HTML, CSS, JavaScript
2. Create responsive Web designs that work on phones, tablets, or traditional laptops and wide-screen monitors.
3. Develop websites using jQuery to provide interactivity and engaging user experiences
4. Embed Google chart tools in a website for better visualization of data.
5. Design and develop web applications using Content Management Systems like WordPress

**(C210) ENVIRONMENTAL SCIENCE**

**COURSE OUTCOMES:**

1. Grasp multidisciplinary nature of environmental studies and various renewable and nonrenewable resources.
2. Understand flow and bio-geo- chemical cycles and ecological pyramids.
3. Understand various causes of pollution and solid waste management and related preventive measures.
4. About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
5. Casus of population explosion, value education and welfare programmes.

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

**(C210) Deterministic & Stochastic Statistical Methods**

**COURSE OUTCOMES:**

1. Apply logical thinking to problem-solving in context.
2. Employ methods related to these concepts in a variety of data science applications.
3. Use appropriate technology to aid problem-solving and data analysis.
4. The Bayesian process of inference in probabilistic reasoning system.
5. Demonstrate skills in unconstrained optimization.

**(C211) Database Management Systems**

**COURSE OUTCOMES:**

1. Design a database for a real-world information system
2. Define transactions that 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 the database.

**(C212) 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 the design of operating systems
4. Understand the functionality of the file system & compare and contrast memory management techniques.
5. Understand deadlock prevention and avoidance & perform administrative tasks on Linux based systems.

**(C213) Software Engineering**

**COURSE OUTCOMES:**

1. Obtain basic software life cycle activity skills.
2. Design software requirements specifications 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.

**(C214) Managerial Economics & Financial Analysis**

**COURSE OUTCOMES:**

1. Define the concepts related to Managerial Economics, financial accounting and management.
2. Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
3. Apply the Concept of Production cost and revenues for effective Business decision
4. Analyze how to invest their capital and maximize returns
5. Evaluate the capital budgeting techniques & develop the accounting statements and evaluate the financial performance of business entity.

**(C215) Database Management Systems Lab**

**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

**(C216) Operating Systems Lab**

**COURSE OUTCOMES:**

1. Trace different CPU Scheduling algorithms (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 & Design new scheduling algorithms (L6).

**(C217) 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

**(C218) Exploratory Data Analysis with R**

**COURSE OUTCOMES:**

1. Install and use R for simple programming tasks.
2. Extend the functionality of R by using add-on packages
3. Extract data from files and other sources and perform various data manipulation tasks on them.
4. Explore statistical functions in R.
5. Use R Graphics and Tables to visualize results of various statistical operations on data.
6. Apply the knowledge of R gained to data Analytics for real-life applications.

**(C219) Design Thinking for Innovation**

**COURSE OUTCOMES:**

1. Define the concepts related to design thinking.
2. Explain the fundamentals of Design Thinking and innovation
3. Apply the design thinking techniques for solving problems in various sectors.
4. Analyse to work in a multidisciplinary environment
5. Evaluate the value of creativity & Formulate specific problem statements of real time issues

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

**(C301) Computer Networks**

**COURSE OUTCOMES:**

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

**(C302) Artificial Intelligence**

**COURSE OUTCOMES:**

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

**(C303) 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)

**(C304) Software Project Management**

**COURSE OUTCOMES:**

1. Describe the fundamentals of Project Management
2. Recognize and use Project Scheduling Techniques
3. Familiarize with Project Control Mechanisms
4. Understand Team Management
5. Recognize the importance of Project Documentation and Evaluation

**(C305) Computer Networks Lab**

**COURSE OUTCOMES:**

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

**(C306) Artificial Intelligence Lab**

**COURSE OUTCOMES:**

1. Implement search algorithms
2. Solve Artificial intelligence problems
3. Design chatbot and virtual assistant

**(C307) Advanced Web Application Development**

**COURSE OUTCOMES:**

1. Create dynamic websites using PHP and MySQL
2. Handle Authentication using Sessions, JWT.
3. Secure Web applications from common attacks like Injection, XSS.
4. Integrate Libraries to dynamically generate documents, spreadsheets, pdfs, etc.
5. Host Websites in traditional web hosting platforms and also Cloud based infrastructure