



VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

Affiliated to JNTUH, Approved by AICTE, Accredited by NAAC with A++ Grade, ISO 9001:2015 Certified
Kacharam, Shamshabad, Hyderabad – 501218, Telangana, India

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

List of Course Outcomes

R22 Regulations

Semester No:	I B. Tech I Sem		
Course Title:	Matrices and Calculus	Course Code:	A8001
Course Outcome No.	Course Outcome Statement		
A8001.1	Solve system of linear equations using rank of a matrix.		
A8001.2	Examine the nature of quadratic form using eigen values and eigen vectors.		
A8001.3	Evaluate improper integrals using Beta and Gamma Functions.		
A8001.4	Examine the extremum of a function of several variables.		
A8001.5	Make use of multiple integrals to find the area and volume of a solid.		
Semester No:	I B. Tech I Sem		
Course Title:	Engineering Chemistry	Course Code:	A8008
Course Outcome No.	Course Outcome Statement		
A8008.1	Apply the knowledge of electrochemical series to protect different metals from corrosion.		
A8008.2	Analyze the hardness and other impurities present in the water for industrial and domestic applications		
A8008.3	Evaluate the behaviour of different engineering materials.		
A8008.4	Analyze the different types of fossil fuels, characteristics and their applications		
A8008.5	Compare the materials to study various physical and chemical properties.		
Semester No:	I B. Tech I Sem		
Course Title:	English for Skill Enhancement	Course Code:	A8010
Course Outcome No.	Course Outcome Statement		
A8010.1	Build competence in grammar for effective communication.		
A8010.2	Acquire suitable vocabulary required for achieving communicative competence.		
A8010.3	Utilize academic reading skills to comprehend different texts effectively.		
A8010.4	Develop effective writing skills for academic purposes.		
A8010.5	Demonstrate basic proficiency in professional correspondence.		
Semester No:	I B. Tech I Sem		
Course Title:	Digital Electronics	Course Code:	A8402
Course Outcome No.	Course Outcome Statement		
A8402.1	Apply Boolean algebra and minimization techniques to simplify a Boolean function.		
A8402.2	Build combinational circuits using logic gates.		
A8402.3	Analyze the behavior of latches and flip-flops for designing sequential logic.		

A8402.4	Construct synchronous sequential circuits using flip-flops and combinational logic.		
A8402.5	Make use of Programmable Logic Devices in the design of digital systems.		
Semester No:	I B. Tech I Sem		
Course Title:	Problem Solving through C	Course Code:	A8501
Course Outcome No.	Course Outcome Statement		
A8501.1	Identify various building blocks to write a C program.		
A8501.2	Use control statements for solving a given problem.		
A8501.3	Write programs using arrays and strings to store and manipulate sequential data.		
A8501.4	Build programs with functions and structures for solving a complex problem.		
A8501.5	Make use of Pointers and Files to store and retrieve data efficiently.		
Semester No:	I B. Tech I Sem		
Course Title:	Engineering Chemistry Laboratory	Course Code:	A8009
Course Outcome No.	Course Outcome Statement		
A8009.1	Apply the instrumental techniques to find out the concentrations or equivalence points of solutions.		
A8009.2	Analyse the impurities present in the water using volumetric analysis.		
A8009.3	Make use of different titrations to measure various properties of chemical species.		
A8009.4	Analyse the importance of temperature and pressure on physical properties like viscosity and surface tension of liquids.		
A8009.5	Calculate the yield of synthetic drugs by maintaining specific reaction conditions		
Semester No:	I B. Tech I Sem		
Course Title:	English Language and Communication Skills Laboratory	Course Code:	A8011
Course Outcome No.	Course Outcome Statement		
A8011.1	Acquire the received pronunciation and speak in a neutral accent.		
A8011.2	Use contextual vocabulary for lucid spoken communication.		
A8011.3	Comprehend accent of different varieties of English.		
A8011.4	Develop skills for professional presentations.		
A8011.5	Demonstrate the ability to communicate by enhancing listening skills		
Semester No:	I B. Tech I Sem		
Course Title:	Problem Solving through C Laboratory	Course Code:	A8502
Course Outcome No.	Course Outcome Statement		
A8502.1	Use various programming constructs of C to solve a given problem.		
A8502.2	Make use of arrays, pointers and structures to organize data.		
A8502.3	Develop applications using functions for code reuse.		
A8502.4	Write programs using files for storing and accessing data.		

Semester No:	I B. Tech I Sem		
Course Title:	Computer Aided Drawing	Course Code:	A8302
Course Outcome No.	Course Outcome Statement		
A8302.1	Illustrate various menu bars and tool bars on AutoCAD interface.		
A8302.2	Differentiate first angle and Third angle projection system based on representation of orthographic views.		
A8302.3	Create orthographic views of points, lines, planes and solids using appropriate tools.		
A8302.4	Develop the lateral surface areas of regular solids by construction methods.		
A8302.5	Model 3-dimentional views of simple objects using isometric coordinates.		
Semester No:	I B. Tech I Sem		
Course Title:	Social Innovation	Course Code:	A8021
Course Outcome No.	Course Outcome Statement		
A8021.1	Develop awareness on social issues faced by local regions.		
A8021.2	Identify the mind set of human Race and interpret the societal issues as simple, complicated, and complex problems.		
A8021.3	Identify the need statement along with its main causes and effects.		
A8021.4	Develop an innovative and sustainable solution for social issues by thinking critically and creatively.		
Semester No:	I B. Tech II Sem		
Course Title:	Ordinary Differential Equations and Vector Calculus	Course Code:	A8002
Course Outcome No.	Course Outcome Statement		
A8002.1	Solve ordinary differential equations of first and higher order.		
A8002.2	Make use of ordinary differential equations to solve engineering problems.		
A8002.3	Apply Laplace transforms to solve ordinary differential equations.		
A8002.4	Determine divergence and curl of a vector point function.		
A8002.5	Make use of vector integral theorems to evaluate area, surface area and volumes		
Semester No:	I B. Tech II Sem		
Course Title:	Applied Physics	Course Code:	A8006
Course Outcome No.	Course Outcome Statement		
A8006.1	Analyse the properties of quantum computers by quantum physics.		
A8006.2	Apply wave property of light to study different optical phenomenon.		
A8006.3	Interpret the charge carrier dynamics in semiconductors.		
A8006.4	Develop communication systems by means of lasers and optical fibres.		
A8006.5	Analyse the principles of nanoscience and technology for electronic applications.		
Semester No:	I B. Tech II Sem		
Course Title:	Basic Electrical Engineering	Course Code:	A8204
Course Outcome No.	Course Outcome Statement		
A8204.1	Apply DC circuit principles, network reduction techniques, and theorems to solve Complex DC circuits.		

A8204.2	Analyse single-phase AC circuits using sinusoidal waveforms, average and RMS values, and j-notation.		
A8204.3	Analyse 1-phase transformer principles, construction, EMF equation, and no load and on-load conditions.		
A8204.4	Analyse the operation and characteristics of DC generators and motors, including EMF and torque equations.		
A8204.5	Evaluate the construction, operation, and torque characteristics of three-phase induction motors and synchronous generators.		
Semester No:	I B. Tech II Sem		
Course Title:	Data Structures	Course Code:	A8505
Course Outcome No.	Course Outcome Statement		
A8505.1	Select appropriate sorting and searching technique for a given application.		
A8505.2	Use various forms of linked lists to perform operations on data efficiently.		
A8505.3	Build applications using stack data structure for real time applications.		
A8505.4	Construct various forms of Queues to solve a real time problem.		
A8505.5	Make use of nonlinear data structures for organizing data.		
Semester No:	I B. Tech II Sem		
Course Title:	Computer Organization	Course Code:	A8506
Course Outcome No.	Course Outcome Statement		
A8506.1	Identify various functional aspects of computer hardware.		
A8506.2	Choose various instructions and addressing modes to execute an instruction.		
A8506.3	Make use of integer and floating-point algorithms to perform arithmetic operations on data		
A8506.4	Design control unit and memory for a computer system.		
A8506.5	Examine the performance of a system using pipelining and multiprocessors		
Semester No:	I B. Tech II Sem		
Course Title:	Applied Physics Laboratory	Course Code:	A8007
Course Outcome No.	Course Outcome Statement		
A8007.1	Evaluation of properties of light radiation by wave optics		
A8007.2	Interpret the principles of semiconductors.		
A8007.3	Determine the properties of laser light and estimate losses in optical fibre.		
A8007.4	Analyse the VI characteristics of LED and solar cell.		
A8007.5	Apply resonance principle to calculate frequency of AC supply.		
Semester No:	I B. Tech II Sem		
Course Title:	Basic Electrical Engineering Laboratory	Course Code:	A8205
Course Outcome No.	Course Outcome Statement		
A8205.1	Analyse and demonstrate the application of Ohm's Law and Kirchhoff's Laws in a provided DC circuit.		
A8205.2	Demonstrate practical application and evaluation skills by verifying Superposition, Thevenin's, and Norton's theorems in provided circuits.		

A8205.3	Generate and interpret graphical representations illustrating the inherent characteristics of both DC machines and AC machines.		
A8205.4	Evaluate the operational characteristics of DC motor, single-phase transformer, Alternator, and three-phase Induction motor through comprehensive testing procedures		
Semester No:	I B. Tech II Sem		
Course Title:	Engineering Workshop	Course Code:	A8301
Course Outcome No.	Course Outcome Statement		
A8301.1	Identify the trade-based materials and tools to prepare the models.		
A8301.2	Illustrate each trade and tool by hands on training in making the models.		
A8301.3	Apply different workshop practice methods towards workshop models.		
A8301.4	Analyse the trade-based operations in the process of product development.		
A8301.5	Develop a progressive product towards a societal need.		
Semester No:	I B. Tech II Sem		
Course Title:	Data Structures Laboratory	Course Code:	A8507
Course Outcome No.	Course Outcome Statement		
8507.1	Implement various searching and sorting techniques on a given data.		
8507.2	Organize data efficiently using linked lists.		
8507.3	Perform various operations on data structures using arrays and linked lists.		
8507.4	Write programs to traverse tree using linked list.		
Semester No:	I B. Tech II Sem		
Course Title:	Python Programming Laboratory	Course Code:	A8508
Course Outcome No.	Course Outcome Statement		
A8508.1	Use expressions and control statements for solving a given problem.		
A8508.2	Build programs on sequence of characters using string operations and built in functions.		
A8508.3	Implement fundamental data structures for manipulating data.		
A8508.4	Build user defined functions and modules to improve code reusability		
Semester No:	I B. Tech II Sem		
Course Title:	Engineering Exploration	Course Code:	A8022
Course Outcome No.	Course Outcome Statement		
A8022.1	Compare and contrast the contributions of different types of engineers in the development of a product, process, or system.		
A8022.2	Apply the common engineering design process to solve complex problems and arrive at viable solution.		
A8022.3	Explore various contemporary software and hardware tools to provide solutions for the problems.		
A8022.4	Apply skills needed for successful teamwork including the basics of project management and written and oral communication.		
A8022.5	Identify the key elements of professional codes of ethics as well as the ethical and societal issues related to the disciplines and their impact on society and the world		

Semester No:	II B. Tech I Sem		
Course Title:	Business Economics and Financial Analysis	Course Code:	A8013
Course Outcome No.	Course Outcome Statement		
A8013.1	Examine the types of business and impact of macroeconomic variables on business.		
A8013.2	Analyse interrelationship among various economic variables and its impact.		
A8013.3	Classify the market structure to decide the fixation of suitable price.		
A8013.4	Apply accounting principles & rules for preparing financial statements.		
A8013.5	Analyse financial statements to assess financial health of business.		
Semester No:	II B. Tech I Sem		
Course Title:	Discrete Mathematical Structures	Course Code:	A8509
Course Outcome No.	Course Outcome Statement		
A8509.1	Identify the importance of statements and predicate calculus in deriving valid inferences.		
A8509.2	Use relations and ordering methods to identify the relationship among the elements in the system.		
A8509.3	Select suitable algebraic systems to find solutions for real time problems.		
A8509.4	Apply the concepts of counting, inclusion and exclusion principle to solve portioning problems in computer algorithms		
A8509.5	Examine Graph concepts, Recurrence relations and computing methods to solve complex problems with improved efficiency		
Semester No:	II B. Tech I Sem		
Course Title:	Object Oriented Programming	Course Code:	A8601
Course Outcome No.	Course Outcome Statement		
A8601.1	Make use of various constructs to write a console application.		
A8601.2	Apply principles of OOP to develop real time applications.		
A8601.3	Examine the applications for Exception Handling and Multithreading.		
A8601.4	Implement Collection Framework and Streams to organize and manipulate data efficiently		
A8601.5	Build GUI applications using Swings and event handling.		
Semester No:	II B. Tech I Sem		
Course Title:	Operating Systems	Course Code:	A8510
Course Outcome No.	Course Outcome Statement		
A8510.1	Identify the various services provided for user and system.		
A8510.2	Examine the concepts of IPC and Synchronization among cooperating processes.		
A8510.3	Make use of the Memory Management techniques for efficient use of main memory.		
A8510.4	Select appropriate File and Disk Management schemes for effective storage.		
A8510.5	Identify a Deadlock Handling Method to allocate resources among processes.		

Semester No:	II B. Tech I Sem		
Course Title:	Advanced Data Structures	Course Code:	A8511
Course Outcome No.	Course Outcome Statement		
A8511.1	Implement Linked lists and Queues to process the given data		
A8511.2	Design various non-linear data structures suitable for a given application.		
A8511.3	Examine the various search trees to organize data.		
A8511.4	Make use of Dictionaries and Hash Tables for efficient search operation.		
A8511.5	Develop algorithm for text processing applications		
Semester No:	II B. Tech I Sem		
Course Title:	Object Oriented Programming Laboratory	Course Code:	A8602
Course Outcome No.	Course Outcome Statement		
A8602.1	Make use of various constructs to write a console application.		
A8602.2	Use principles of OOP to develop real time applications.		
A8602.3	Examine the applications for Exception Handling and Multithreading		
A8602.4	Implement Collection Framework to organize data efficiently.		
A8602.5	Build GUI applications using Swings.		
Semester No:	II B. Tech I Sem		
Course Title:	Operating Systems Laboratory	Course Code:	A8512
Course Outcome No.	Course Outcome Statement		
A8512.1	Make use of Unix utilities and System calls for Process, Memory and File Management.		
A8512.2	Establish communication among processes using IPC.		
A8512.3	Write Shell script to simulate Unix commands and run own script.		
A8512.4	Implement the services like Page replacement algorithm and deadlock handling methods		
Semester No:	II B. Tech I Sem		
Course Title:	Advanced Data Structures Laboratory	Course Code:	A8513
Course Outcome No.	Course Outcome Statement		
A8513.1	Implement programs using linear data structures to process data		
A8513.2	Implement operations on non-linear data structures for handling large data.		
A8513.3	Build traversal algorithms for efficient search on nonlinear data structures.		
A8513.4	Develop algorithms for text processing applications.		
Semester No:	II B. Tech I Sem		
Course Title:	Engineering Design Thinking	Course Code:	A8023
Course Outcome No.	Course Outcome Statement		
A8023.1	Interpret the problem-solving skills and product design skills.		
A8023.2	Apply foundational knowledge of the primary fields of engineering and scientific concepts to find sustainable solution.		
A8023.3	Customize the HCD model to the traditional engineering design process.		

A8023.4	Inspect the design and assess a prototype that solves real engineering problem.		
A8023.5	Expound the solutions for identified problems and document the findings/reflections for further design.		
Semester No:	II B. Tech I Sem		
Course Title:	Environmental Science and Technology	Course Code:	A8032
Course Outcome No.	Course Outcome Statement		
A8032.1	Illustrate the important components of environment.		
A8032.2	Identify global environmental problems to come out with best possible solutions.		
A8032.3	Make use of environmental laws & environmental ethics for the protection of forest and wildlife.		
A8032.4	Apply to maintain harmonious relation between nature and human being and integrating sustainable development goals into their engineering practice.		
A8032.5	Analyse the major environmental effects of exploiting natural resources.		
Semester No:	II B. Tech II Sem		
Course Title:	Computer Oriented Statistical Methods	Course Code:	A8005
Course Outcome No.	Course Outcome Statement		
A8005.1	Identify an appropriate probability distribution for a given discrete or continuous random variable and compute probabilities.		
A8005.2	Make use of probability distributions to analyse and solve a given problem.		
A8005.3	Interpret correlation coefficient in context and study regression analysis and apply statistical methods for analysing experimental data.		
A8005.4	Inspect scientific hypothesis and estimate confidence intervals at different levels.		
A8005.5	Compute P-value of a test statistics using component of hypothesis test.		
Semester No:	II B. Tech II Sem		
Course Title:	Database Management Systems	Course Code:	A8514
Course Outcome No.	Course Outcome Statement		
A8514.1	Design a database for a given problem using E-R diagrams and Relational Model.		
A8514.2	Construct Queries in Relational algebra and SQL for a case study.		
A8514.3	Use Normalization techniques to reduce data redundancy in data base.		
A8514.4	Select transaction control and recovery methods to keep data base consistent.		
A8514.5	Compare various indexing techniques and NoSQL databases for efficient access.		
Semester No:	II B. Tech II Sem		
Course Title:	Formal Languages and Automata Theory	Course Code:	A8515
Course Outcome No.	Course Outcome Statement		

A8515.1	Interpret the core concepts of automata theory to design finite automata for given formal languages		
A8515.2	Identify the relationship between formal languages, automata and regular expression		
A8515.3	Write and simplify context free grammars for formal languages.		
A8515.4	Construct push down automata for various formal language constructs.		
A8515.5	Model Turing machine to recognize formal languages and computational operations		
Semester No:	II B. Tech II Sem		
Course Title:	Design and Analysis of Algorithms	Course Code:	A8516
Course Outcome No.	Course Outcome Statement		
A8516.1	Make use of asymptotic notations, divide and conquer techniques to decompose complex problems into small and sim		
A8516.2	Choose Greedy method to find out feasible solutions of problems.		
A8516.3	Examine complex engineering problems in finding the optimal solution.		
A8516.4	Construct all possible solutions using backtracking methods.		
A8516.5	Inspect Branch and Bound techniques and NP complete problems significance in algorithms		
Semester No:	II B. Tech II Sem		
Course Title:	Artificial Intelligence	Course Code:	A8702
Course Outcome No.	Course Outcome Statement		
A8702.1	Apply AI techniques to solve game playing theorem proving and machine learning.		
A8702.2	Apply the propositional logic to AI designs.		
A8702.3	Learn different playing and reinforcement learning techniques.		
A8702.4	Examine the role of searching strategies in AI environment.		
A8702.5	Analyse the constraint satisfaction problems for problem solving		
Semester No:	II B. Tech II Sem		
Course Title:	Database Management Systems Laboratory	Course Code:	A8517
Course Outcome No.	Course Outcome Statement		
A8517.1	Design a database for a given problem using E-R diagrams and Relational Model		
A8517.2	Construct Queries in SQL for a given case study		
A8517.3	Use PL/SQL concepts to access database in web based/standard applications		
A8517.4	Develop applications with support of database operations in python.		
Semester No:	II B. Tech II Sem		
Course Title:	Python for Data Analysis (Skill Development)	Course Code:	A8518
Course Outcome No.	Course Outcome Statement		
A8518.1	Develop NumPy arrays and performs vector operations on given data.		
A8518.2	Make use of SciPy package for visualizing and manipulating data.		

A8518.3	Write programs to manipulate and find hidden patterns in data using pandas.		
A8518.4	Compare various plotting techniques to visualize the real time data.		
Semester No:	II B. Tech II Sem		
Course Title:	IoT Laboratory	Course Code:	A8603
Course Outcome No.	Course Outcome Statement		
A8603.1	Identify the need of various hardware and software components in developing IoT applications		
A8603.2	Construct IoT applications using Raspberry Pi interface.		
A8603.3	Develop IoT applications on embedded platform using Arduino.		
A8603.4	Apply Arduino programming in IoT applications		
Semester No:	II B. Tech II Sem		
Course Title:	Product Realization	Course Code:	A8024
Course Outcome No.	Course Outcome Statement		
A8024.1	Interpret the specifications of product and solve for practical realization.		
A8024.2	Analyse the customers mind set and design the product.		
A8024.3	Develop Gantt chart to define timeline for product realization		
A8024.4	Conceptualize the terms called product, purchase, production and monitoring of products.		
A8024.5	Communicate the process of converting an idea to physical product to the community.		
Semester No:	II B. Tech II Sem		
Course Title:	Gender Sensitization	Course Code:	A8031
Course Outcome No.	Course Outcome Statement		
A8031.1	Interpret gender sensitization and problems of other genders.		
A8031.2	Identify the reasons for the female feticide		
A8031.3	Attain a finer grasp of how gender discrimination works in our society and how to counter it.		
A8031.4	Develop sensitivity towards sexual and domestic violence.		
A8031.5	Recognize gender sensitivity issues through literature and media.		
Semester No:	II B. Tech II Sem		
Course Title:	Universal Human Values 2 : Understanding Harmony	Course Code:	A8033
Course Outcome No.	Course Outcome Statement		
A8033.1	Analyse the process of self-exploration, right understanding, relationships, natural acceptance for achieving ultimate happiness .		
A8033.2	Examine human being as a co-existence of self 'I' and the material 'Body'.		
A8033.3	Correlate the universal harmonious order in society, undivided society and from family to world family.		
A8033.4	Interpret the harmony in nature, holistic perception at all levels of existence.		
A8033.5	Analyse professional competence for augmenting universal human order, ethical human conduct for acceptance of human value		

Semester No:	III B. Tech I Sem		
Course Title:	Computer Networks	Course Code:	A8519
Course Outcome No.	Course Outcome Statement		
A8519.1	Identify the Reference models and Physical connections for establishing network.		
A8519.2	Choose access control and error handling techniques for data link layer.		
A8519.3	Examine the various routing and congestion control algorithms for packet transmission.		
A8519.4	Choose a transport layer protocol to provide communication services.		
A8519.5	Identify application layer protocol for interacting with user and user applications.		
Semester No:	III B. Tech I Sem		
Course Title:	Software Engineering	Course Code:	A8520
Course Outcome No.	Course Outcome Statement		
A8520.1	Identify the design issues and process models to develop a software.		
A8520.2	Determine the functional and nonfunctional requirements with appropriate validation for a software product.		
A8520.3	Develop software design documents for the given requirements.		
A8520.4	Prepare test documents at various stages to validate project.		
A8520.5	Illustrate the need of quality management and metrics for product standardization		
Semester No:	III B. Tech I Sem		
Course Title:	Web Technologies	Course Code:	A8604
Course Outcome No.	Course Outcome Statement		
A8604.1	Design static and interactive web pages for a given application.		
A8604.2	Organize real time data to share in heterogeneous environment.		
A8604.3	Develop java applications using JDBC to interact with database.		
A8604.4	Deploy server-side components to provide services to client.		
A8604.5	Design dynamic and data driven web pages in client-server environment.		
Semester No:	III B. Tech I Sem		
Course Title:	Machine Learning	Course Code:	A8703
Course Outcome No.	Course Outcome Statement		
A8703.1	Identify the various concepts and challenges in machine Learning.		
A8703.2	Select modelling and evaluation technique for handling real time data.		
A8703.3	Use supervised and unsupervised learning algorithms for a given problem.		
A8703.4	Examine supervised and unsupervised learning algorithms for analysing data		
A8703.5	Identify the various concepts of neural network to develop AI based applications.		

Semester No:	III B. Tech I Sem (Professional Elective-1)		
Course Title:	Ethical Hacking	Course Code:	A8651
Course Outcome No.	Course Outcome Statement		
A8651.1	Use the various security tools to assess the computing system.		
A8651.2	Identify the vulnerabilities across any computing system using penetration testing		
A8651.3	Choose a prediction mechanism to prevent any kind of attacks.		
A8651.4	Make use of Metasploit tool to probe systematic vulnerabilities on networks and servers.		
A8651.5	Identify the wireless network flaws and fill security patches in web access.		
Semester No:	III B. Tech I Sem (Professional Elective-1)		
Course Title:	Data Science for Engineers	Course Code:	A8851
Course Outcome No.	Course Outcome Statement		
A8851.1	Identify the various requirements for data science process.		
A8851.2	Choose an appropriate database required for processing data.		
A8851.3	Demonstrate the data science methodology and text mining approaches.		
A8851.4	Make use of data science tools to visualize the insights of data.		
A8851.5	Apply various data visualization techniques using Tableau over Google Sheets.		
Semester No:	III B. Tech I Sem (Professional Elective-1)		
Course Title:	Advanced Computer Architecture	Course Code:	A8551
Course Outcome No.	Course Outcome Statement		
A8551.1	Identify the various concepts of parallelism in Hardware and Software.		
A8551.2	Identify the various concepts of parallelism in Hardware and Software.		
A8551.3	Demonstrate the complex architectures to provide parallel processing.		
A8551.4	Examine the design requirements of multi-processor architectures.		
A8551.5	Compare VLSI based architectures for efficient processing.		
Semester No:	III B. Tech I Sem (Professional Elective-1)		
Course Title:	Unified Modelling Language	Course Code:	A8557
Course Outcome No.	Course Outcome Statement		
A8557.1	Understand the concepts of UML.		
A8557.2	Analyse the real-time scenarios.		
A8557.3	Identify the Objects and Classes based on the case study.		
A8557.4	Design the structural and behavioural models.		
A8557.5	Apply advanced UML concepts to model the scenarios.		
Semester No:	III B. Tech I Sem		
Course Title:	Web Technologies Laboratory	Course Code:	A8605
Course Outcome No.	Course Outcome Statement		
A8605.1	Design static and dynamic web pages for a real time problem.		

A8605.2	Choose appropriate method for defining rules for the XML document.		
A8605.3	Make use of JDBC API to interact with databases.		
A8605.4	Develop web applications in client server environment.		
Semester No:	III B. Tech I Sem		
Course Title:	Machine Learning Laboratory	Course Code:	A8704
Course Outcome No.	Course Outcome Statement		
A8704.1	Understand the implementation procedures for the machine learning algorithms.		
A8704.2	Design Python programs for various Learning algorithms.		
A8704.3	Apply appropriate data sets to the Machine Learning algorithms.		
A8704.4	Identify and apply Machine Learning algorithms to solve real-world problems		
A8704.5	Apply various preprocessing techniques on data sets		
Semester No:	III B. Tech I Sem		
Course Title:	Mobile Application Development (Skill Development)	Course Code:	A8606
Course Outcome No.	Course Outcome Statement		
A8606.1	Identify the architecture, features and tools to design mobile applications.		
A8606.2	Create effective user interfaces that leverage evolving mobile device capabilities		
A8606.3	Design, customize and enhance mobile applications with widgets		
A8606.4	Develop user friendly mobile applications with application components.		
A8606.5	Build database applications to provide comprehensive mobile development solutions.		
Semester No:	III B. Tech I Sem		
Course Title:	Advanced English Communication Skills Laboratory	Course Code:	A8012
Course Outcome No.	Course Outcome Statement		
A8012.1	Improve comprehensive skills in listening and reading.		
A8012.2	Develop effective technical writing skills and e- correspondence		
A8012.3	Build communication skills in different socio-cultural and professional contexts.		
A8012.4	Organize the dynamics of group discussion for effective participation.		
A8012.5	Analyse strategies to succeed in interviews.		
Semester No:	III B. Tech I Sem		
Course Title:	Research Methodology	Course Code:	A8035
Course Outcome No.	Course Outcome Statement		
A8035.1	Identify an appropriate research problem in their suitable domain.		
A8035.2	Explain the concepts and procedures of sampling, data collection, analysis, and reporting.		
A8035.3	Analyse the complex issues inherent in selecting a research problem, research design, and implementing a research project.		
A8035.4	Construct a well-structured research paper and scientific presentations.		

A8035.5	Express the importance of research ethics in the scientific community.		
Semester No:	III B. Tech II Sem		
Course Title:	Cloud Computing and Virtualization	Course Code:	A8522
Course Outcome No.	Course Outcome Statement		
A8522.1	Demonstrate cloud services, architecture and layers in cloud environment.		
A8522.2	Identify the cloud migration model and challenges of integration in cloud sectors		
A8522.3	Make use of virtualization concepts in cloud.		
A8522.4	Select cloud storage, privacy approaches for efficient implementation of cloud.		
A8522.5	Implement IaaS / PaaS service on a public cloud using any open-source tool		
Semester No:	III B. Tech II Sem		
Course Title:	Information Security	Course Code:	A8607
Course Outcome No.	Course Outcome Statement		
A8607.1	Recognize various security threats, services, mechanisms, and classical encryption techniques.		
A8607.2	Apply classical encryption algorithms (Substitution and Transposition ciphers) and DES, AES algorithms to encrypt plain text.		
A8607.3	Explain various key management techniques, exemplifying RSA and Diffie Hellman		
A8607.4	Examine the problems of authentication techniques (SHA, Digital signature).		
A8607.5	Analyse different symmetric key distribution and understanding of various authentication applications		
Semester No:	III B. Tech II Sem		
Course Title:	Compiler Design	Course Code:	A8523
Course Outcome No.	Course Outcome Statement		
A8523.1	Use finite automata to recognize the tokens by lexical analyser.		
A8523.2	Interpret various parsing techniques to construct syntax analyser.		
A8523.3	Interpret SDT for various transformations of programming language construct		
A8523.4	Discuss various runtime environment and symbol table implementations.		
A8523.5	Demonstrate the various code optimization techniques for improving efficiency of target code.		
Semester No:	III B. Tech II Sem (Professional Elective-II)		
Course Title:	Cyber Security	Course Code:	A8652
Course Outcome No.	Course Outcome Statement		
A8652.1	Identify the cybercrimes and offences in network accesses.		
A8652.2	Interpret the criminal plans before going to attack.		
A8652.3	Choose various security measures on mobile devices for a given scenario and make an effective report.		
A8652.4	Identify the various methods and tools in Cyber Crime.		
A8652.5	Examine various defence and analysis techniques to protect our		

	information from attackers		
Semester No:	III B. Tech II Sem (Professional Elective-II)		
Course Title:	Data Analytics	Course Code:	A8804
Course Outcome No.	Course Outcome Statement		
A8804.1	Identify the various design requirements for training a neural network.		
A8804.2	Select appropriate parameters and architectures in building a deep network.		
A8804.3	Choose Vectorization and Normalization technique for real time data.		
A8804.4	Examine different CNN Models for image and object recognition and classification		
A8804.5	Make use of RNN architectures to handle sequential or time series data.		
Semester No:	III B. Tech II Sem (Professional Elective-II)		
Course Title:	Parallel Computing	Course Code:	A8552
Course Outcome No.	Course Outcome Statement		
A8552.1	Develop an understanding of various basic concepts associated with parallel computing environments.		
A8552.2	Make use of CUDA Programming Model for parallel computing		
A8552.3	Identify various sources of overhead in parallel Programs.		
A8552.3	Examine the algorithms to resolve the Issues in Sorting on Parallel Computers		
A8552.4	Choose appropriate Search Algorithm to solve Discrete Optimization Problems		
Semester No:	III B. Tech II Sem (Professional Elective-II)		
Course Title:	Agile Project Management	Course Code:	A8558
Course Outcome No.	Course Outcome Statement		
A8558.1	Use the Agile project management approach including values and principles for a project.		
A8558.2	Identify the essential roles in a Scrum team for effective development of project working models.		
A8558.3	Make use of Self Organizing Teams to solve issues during the project.		
A8558.4	Build a Product Backlog and perform Backlog Refinement in a given scenario		
A8558.5	Examine large projects by using scrum methods.		
Semester No:	III B. Tech II Sem (Professional Elective-III)		
Course Title:	Web and Database Security	Course Code:	A8653
Course Outcome No.	Course Outcome Statement		
A8653.1	Demonstrate the architecture and applications for web security		
A8653.2	Make use of various techniques in providing security to servers.		
A8653.3	Utilize data access mechanisms for database security		
A8653.4	Identify common application vulnerabilities, prevention of misuse in database.		
A8653.5	Select algorithmic techniques for privacy preserving data.		
Semester No:	III B. Tech II Sem (Professional Elective-III)		
Course Title:	Deep Learning	Course Code:	A8707

Course Outcome No.	Course Outcome Statement		
A8707.1	Identify the need of neural networks and deep learning for a given problem.		
A8707.2	Build a CNN model on the real time data.		
A8707.3	Model sequence classification applications using RNN.		
A8707.4	Build a deep learning model using encoders		
A8707.5	Make use of generative models in various creative tasks		
Semester No:	III B. Tech II Sem (Professional Elective-III)		
Course Title:	Grid Computing	Course Code:	A8553
Course Outcome No.	Course Outcome Statement		
A8553.1	Demonstrate the key terms and requirements of grid computing.		
A8553.2	Choose appropriate design considerations for building grid architecture.		
A8553.3	Examine the security standards and process for grid environment.		
A8553.4	Demonstrate web services resource frame work to work with grid.		
A8553.5	Use Globus Toolkit for installation and configuration for grid setup		
Semester No:	III B. Tech II Sem (Professional Elective-III)		
Course Title:	Software Testing Methodologies	Course Code:	A8559
Course Outcome No.	Course Outcome Statement		
A8559.1	Identify terminology, basic concepts, test processes for continuous quality improvement.		
A8559.2	Select an appropriate testing methodology for a given problem.		
A8559.3	Make use of transaction flow testing and data flow testing techniques on an application.		
A8559.4	Use software testing methods and modern software testing tools for automation of testing process.		
Semester No:	III B. Tech II Sem		
Course Title:	Cloud Computing and Virtualization Laboratory	Course Code:	A8524
Course Outcome No.	Course Outcome Statement		
A8524.1	Create and Configure Virtual machines and Lambda Service.		
A8524.2	Implement IAM for user management and access control		
A8524.3	Create and manage S3 buckets with proper configurations.		
A8524.4	Set up and Configure Virtual Private Clouds (VPCs) and Subnets.		
A8524.5	Deploy and manage Relational Database using RDS.		
Semester No:	III B. Tech II Sem		
Course Title:	Network and Information Security Laboratory	Course Code:	A8612
Course Outcome No.	Course Outcome Statement		
A8612.1	Classify the socket techniques which perform communication operation in networks		
A8612.2	Deploy the networking protocols with simulators.		
A8612.3	Apply the various encryption techniques with programming languages.		
A8612.4	Explore the digital signature techniques.		

Semester No:	III B. Tech II Sem		
Course Title:	RUST Programming (Skill Development)	Course Code:	A8525
Course Outcome No.	Course Outcome Statement		
A8525.1	Create a Rust project and write basic rust programs, including proper Cargo configuration		
A8525.2	Translate a design into a working Rust program.		
A8525.3	Use structs, Enums and traits as intended in the construction of Rust programs.		
A8525.4	Handle different types of errors and use generic types, traits		
Semester No:	III B. Tech II Sem		
Course Title:	Internship-I	Course Code:	A8041
Course Outcome No.	Course Outcome Statement		
A8041.1	Identify the modern tools used in the field of Computer science and engineering for product development.		
A8041.2	Exercise computational thinking over the entire software life cycle		
A8041.3	Analyse the resources requirement and planning to facilitate the project success.		
A8041.4	Develop ethical and group learning skills for the benefit of society.		
A8041.5	Collaborate within and across disciplinary boundaries to solve problems.		
Semester No:	III B. Tech II Sem		
Course Title:	Mini Project	Course Code:	A8041
Course Outcome No.	Course Outcome Statement		
A8041.1	Apply fundamental and disciplinary concepts and methods in ways appropriate to their principal areas of study.		
A8041.2	Demonstrate skill and knowledge of current information and technological tools and techniques specific to the professional field of study.		
A8041.3	Identify, analyse, and solve problems creatively through sustained critical investigation.		
A8041.4	Demonstrate awareness and application of appropriate personal, societal, and professional ethical standards.		
A8041.5	Practice the skills, diligence, and commitment to excellence needed to engage in lifelong learning.		
Semester No:	III B. Tech II Sem		
Course Title:	Indian Constitution	Course Code:	A8034
Course Outcome No.	Course Outcome Statement		
A8034.1	Identify the important components of Indian Constitution		
A8034.2	Apply the fundamental rights in right way and become a more responsible citizen.		
A8034.3	Illustrate the evolution of Indian Constitution		
A8034.4	Identify the basic structure of Indian Constitution.		
A8034.5	Relate the basic concepts of democracy, liberty, equality, secular and justice.		

Semester No:	IV B. Tech I Sem		
Course Title:	Data Mining	Course Code:	A8526
Course Outcome No.	Course Outcome Statement		
A8526.1	Make use of pre-processing techniques on any given raw data.		
A8526.2	Build data warehouse schemas for enterprise applications.		
A8526.3	Perform market basket analysis using association rule mining.		
A8526.4	Utilize classification techniques for analysis and interpretation of data.		
A8526.5	Identify appropriate clustering and outlier detection techniques to handle complex data.		
Semester No:	IV B. Tech I Sem		
Course Title:	Big Data Analytics	Course Code:	A8806
Course Outcome No.	Course Outcome Statement		
A8806.1	Identify the fundamental concepts of big data analytics.		
A8806.2	Analyse the Hadoop environment and apply HDFS commands on file management tasks.		
A8806.3	Utilize optimization techniques of MapReduce Programming to process massive amounts of data in parallel.		
A8806.4	Make use of NoSQL databases like MongoDB and Cassandra to stock log data to be pulled for analysis.		
A8806.5	Identify appropriate modern tools like Pig and Hive for complex data flow and analysis.		
Semester No:	IV B. Tech I Sem (Professional Elective-IV)		
Course Title:	Cloud Security	Course Code:	A8654
Course Outcome No.	Course Outcome Statement		
A8654.1	Identify the various cloud platforms and risk issues in cloud computing.		
A8654.2	Select the cloud security architecture in different cloud environments.		
A8654.3	Make use of cloud security management techniques for assessment.		
A8654.4	Utilize the security protocols and standards in different levels.		
A8654.5	Identify the insights of data using cloud security analytics		
Semester No:	IV B. Tech I Sem (Professional Elective-IV)		
Course Title:	Natural Language Processing	Course Code:	A8706
Course Outcome No.	Course Outcome Statement		
A8706.1	Identify the structure of words and documents for text preprocessing.		
A8706.2	Choose an approach to parse the given text document.		
A8706.3	Make use of semantic parsing to capture real meaning of text.		
A8706.4	Select a language model to predict the probability of a sequence of words.		
A8706.5	Examine the various applications of NLP.		
Semester No:	IV B. Tech I Sem (Professional Elective-IV)		
Course Title:	Serverless Computing	Course Code:	A8554
Course Outcome No.	Course Outcome Statement		
A8554.1	Understand the principles, providers, and security aspects of		

	serverless computing.		
A8554.2	Develop, deploy, and manage serverless functions and applications, employing best practices and continuous integration/continuous deployment (CI/CD).		
A8554.3	Integrate serverless functions with data storage solutions, secure data, and design scalable serverless data pipelines.		
A8554.4	Design serverless applications using microservices, event-driven architecture, and best practices for scalability		
A8554.5	Inspect advanced serverless topics such as machine learning integration, security, multi-cloud deployments, observability, and emerging trends.		
Semester No:	IV B. Tech I Sem (Professional Elective-IV)		
Course Title:	Design Patterns	Course Code:	A8560
Course Outcome No.	Course Outcome Statement		
A8560.1	Identify the appropriate design patterns to solve object-oriented design problems.		
A8560.2	Develop design solutions using Creational patterns.		
A8560.3	Apply structural patterns to solve design problems.		
A8560.4	Construct design solutions by using behavioural patterns.		
Semester No:	IV B. Tech I Sem (Professional Elective-V)		
Course Title:	IoT Security	Course Code:	A8655
Course Outcome No.	Course Outcome Statement		
A8655.1	Illustrate the fundamental concepts of IoT and its impact on security.		
A8655.2	Explain importance of IoT Design Standards and Protocols for true interoperability between devices and application		
A8655.3	Identify common security threats and vulnerabilities in IoT systems		
A8655.4	Demonstrate cryptographic techniques for securing IoT communication		
A8655.5	Discover emerging trends and challenges in IoT security.		
Semester No:	IV B. Tech I Sem (Professional Elective-V)		
Course Title:	Web and Social Media Analytics	Course Code:	A8856
Course Outcome No.	Course Outcome Statement		
A8856.1	Identify and select key performance indicators to accurately measure the success of social media efforts.		
A8856.2	Develop social media measurement plans and analytics reports, and communicate findings and recommend		
A8856.3	Analyse social media data using Facebook analytics and social media measurement tools		
A8856.4	Compute a variety of network measures from a social media dataset.		
A8856.5	Evaluate Heuristic approach and Website Traffic Analysis.		
Semester No:	IV B. Tech I Sem (Professional Elective-V)		
Course Title:	Edge Computing	Course Code:	A8555
Course Outcome No.	Course Outcome Statement		
A8555.1	Understand edge computing fundamentals, analyse use cases, and assess its advantages and challenges.		
A8555.2	Use various edge computing architectures, considering scalability and redundancy in edge computing		

A8555.3	Choose edge computing technologies, machine learning algorithms and appropriate communication protocols for edge devices.		
A8555.4	Select appropriate secure edge solutions, security mechanisms, and address privacy concerns in edge environments.		
A8555.5	Make use of edge computing solutions for specific applications and stay informed about emerging trends in the field.		
Semester No:	IV B. Tech I Sem (Professional Elective-V)		
Course Title:	Software Architectures	Course Code:	A8561
Course Outcome No.	Course Outcome Statement		
A8561.1	Describe the Fundamentals of software architecture, qualities and terminologies		
A8561.2	Choose the principles and guidelines for software architecture design, architectural styles, patterns, and frameworks.		
A8561.3	Use implementation techniques of Software architecture for effective software development		
A8561.4	Select core values and principles of software architectures for enterprise application development		
Semester No:	IV B. Tech I Sem		
Course Title:	Data Mining Laboratory	Course Code:	A8528
Course Outcome No.	Course Outcome Statement		
A8528.1	Apply various preprocessing Techniques using WEKA tool for the given datasets		
A8528.2	Develop various data integration and transformations using Kettle Pentaho tool.		
A8528.3	Build data Cubes and perform OLAP Operations.		
A8528.4	Apply appropriate association and classification techniques to interpret data and provide valid conclusions		
A8528.5	Apply clustering techniques, compare the results, and write effective reports		
Semester No:	IV B. Tech I Sem		
Course Title:	Big Data Analytics Laboratory	Course Code:	A8807
Course Outcome No.	Course Outcome Statement		
A8807.1	Implement HDFS commands on file management tasks.		
A8807.2	Use of MapReduce Programming to process massive amounts of data in parallel		
A8807.3	Use NoSQL databases like MongoDB and Cassandra to stock log data to be pulled for analysis.		
A8807.4	Implement Pig programs for complex data flow and analysis.		
A8807.5	Implement Hive programs for complex data flow and analysis.		
Semester No:	IV B. Tech I Sem		
Course Title:	Project Work Phase – I	Course Code:	A8042
Course Outcome No.	Course Outcome Statement		
A8042.1	Apply fundamental and disciplinary concepts and methods in ways appropriate to their principal areas of study.		
A8042.2	Demonstrate skill and knowledge of current information and technological tools and techniques specific to the professional field of study.		
A8042.3	Identify, analyze, and solve problems creatively through sustained		

	critical investigation.		
A8042.4	Demonstrate awareness and application of appropriate personal, societal, and professional ethical standards.		
A8042.5	Practice the skills, diligence, and commitment to excellence needed to engage in lifelong learning.		
Semester No:	IV B. Tech II Sem (Professional Elective-VI)		
Course Title:	Blockchain Technology	Course Code:	A8656
Course Outcome No.	Course Outcome Statement		
A8656.1	Identify the basic concepts of block chain to process data		
A8656.2	Make use of Bitcoin as cryptocurrency		
A8656.3	Choose Ethereum block chain for security		
A8656.4	Design smart contracts as per the requirements and deploy on Test networks.		
Semester No:	IV B. Tech II Sem (Professional Elective-VI)		
Course Title:	Optimization Techniques for Analytics	Course Code:	A8853
Course Outcome No.	Course Outcome Statement		
A8853.1	Explain the OR model and its application.		
A8853.2	Develop a knowledge of linear programming and its solutions.		
A8853.3	To model engineering minima/maxima problems as optimization problems.		
A8853.4	Evaluate Game Theory principles in workplace settings.		
A8853.5	Develop a knowledge of non-linear programming.		
Semester No:	IV B. Tech II Sem (Professional Elective-VI)		
Course Title:	Quantum Computing	Course Code:	A8556
Course Outcome No.	Course Outcome Statement		
A8556.1	Identify the concepts linear algebra and physics for quantum computing.		
A8556.2	Make use of quantum computing components for writing an efficient algorithm		
A8556.3	Implement various quantum computing algorithms for complex problems with speed and accuracy		
A8556.4	Choose a cryptographic algorithm for quantum computing.		
Semester No:	IV B. Tech II Sem (Professional Elective-VI)		
Course Title:	Software Process and Project Management	Course Code:	A8562
Course Outcome No.	Course Outcome Statement		
A8562.1	Choose an appropriate framework and process model for building an application.		
A8562.2	Demonstrate the phases of software project management.		
A8562.3	Select a management and planning approach for a given project		
A8562.4	Make use of work flows and check points during the software process.		
A8562.5	Demonstrate the tracking procedure from start to end of a project.		
Semester No:	OPEN ELECTIVE		
Course Title:	Smart Cities	Course Code:	A8181

Course Outcome No.	Course Outcome Statement		
A8181.1	Interpret the concepts, history and evolution of smart cities.		
A8181.2	Identify the elements of smart city such as smart people, smart living, smart economy, smart infrastructure, smart governance and smart environment.		
A8181.3	Analyse the concepts, discourses and practices of smart cities across globe.		
A8181.4	Develop the road map for planning smart cities and benchmarking their performance for Indian context.		
A8181.5	Apply relevance for smart cities of developing economies considering issues as inclusiveness, feasibility and sustainability.		
Semester No:	OPEN ELECTIVE		
Course Title:	Disaster Management	Course Code:	A8182
Course Outcome No.	Course Outcome Statement		
A8182.1	Identify basic concepts of hazards, vulnerabilities and risks of disaster phenomena.		
A8182.2	Interpret various types of disasters and disaster coping strategies.		
A8182.3	Examine Disaster Impacts and suggest suitable capacity building frame work for disaster management.		
A8182.4	Select appropriate steps in Disaster management cycle for Disaster Risk Reduction		
A8182.5	Develop Strategies for disaster management planning and sustainable development.		
Semester No:	OPEN ELECTIVE		
Course Title:	Environmental Pollution Management	Course Code:	A8183
Course Outcome No..1	Course Outcome Statement		
A8183.1	Identify water pollution sources, types and treatment methods.		
A8183.2	Apply knowledge on Prevention and control of air pollution.		
A8183.3	Inspect sources, effects and mitigation methods of noise pollution.		
A8183.4	Examine soil pollution sources, effects and control measures.		
A8183.5	Develop Environmental management plan to minimize environmental pollution.		
Semester No:	OPEN ELECTIVE		
Course Title:	Green Building and Sustainability	Course Code:	A8155
Course Outcome No.	Course Outcome Statement		
A8155.1	Identify green building and green building materials.		
A8155.2	Make use of different rating agencies to classify the type of building		
A8155.3	Analyse sustainability and its implications for the practice of engineering.		
A8155.4	Evaluate the potential of the alternative construction materials for sustainability		
A8155.5	Examine the green building rating systems and its contribution to sustainability		
Semester No:	OPEN ELECTIVE		
Course Title:	Electric Vehicles	Course Code:	A8224
Course Outcome No.	Course Outcome Statement		

A8224.1	Infer the electric vehicle system and its impact on environment.		
A8224.2	Analyse the various hybrid vehicle configurations and its performance.		
A8224.3	Interpret the electric drives used in hybrid and electric vehicles.		
A8224.4	Choose proper energy storage systems for electric vehicle applications.		
A8224.5	Identify the different charging systems and charging infrastructure for EVs.		
Semester No:	OPEN ELECTIVE		
Course Title:	Solar Energy and Applications	Course Code:	A8281
Course Outcome No.	Course Outcome Statement		
A8281.1	Compare the present and future available electrical power from solar energy based on the knowledge of global solar horizontal irradiation.		
A8281.2	Assimilate and acquire the skills for design and engineering of solar thermal and solar photovoltaic technology and systems.		
A8281.3	Identify the problems involved in solar thermal energy conversion technique used in the solar heating and cooling systems for buildings/societal needs.		
A8281.4	Examine the components of a solar photo voltaic system and their function by utilizing the previous literature knowledge on different photovoltaic solar cells.		
A8281.5	Analyse the techno-economics performance and issues in the solar energy system.		
Semester No:	OPEN ELECTIVE		
Course Title:	Energy Storage Systems	Course Code:	A8282
Course Outcome No.	Course Outcome Statement		
A8282.1	Apply the knowledge of concepts of science to understand the concepts of electro chemical cell.		
A8282.2	Apply the knowledge of electro chemistry to describe the components and process in batteries.		
A8282.3	Describe the electrical, thermal, and mechanical behaviour of Li-Ion batteries under various operating conditions.		
A8282.4	Apply the knowledge of basic science concepts to distinguish various types of fuel cells and their functionalities		
A8282.5	Apply the knowledge of science to interpret the operation and characteristics of super capacitors.		
Semester No:	OPEN ELECTIVE		
Course Title:	Power Generation Systems	Course Code:	A8283
Course Outcome No.	Course Outcome Statement		
A8283.1	List the different components of an electric power system.		
A8283.2	Categorize the conventional methods of generating electrical power to meet the required load demand.		
A8283.3	Categorize the non-conventional methods of generating electrical power to meet the required load demand.		
A8283.4	Model a power system to reduce economic losses.		
Semester No:	OPEN ELECTIVE		
Course Title:	Hybrid Vehicles	Course Code:	A8381
Course Outcome No.	Course Outcome Statement		
A8381.1	Identify different types of hybrid vehicles and their power train		

	configurations		
A8381.2	Analyse the energy management strategy for hybrid vehicles		
A8381.3	Develop and optimize the hybrid vehicles subsystems		
A8381.4	Apply advanced technologies and materials in hybrid vehicles design		
A8381.5	Evaluate the performance and environmental impact of hybrid vehicle.		
Semester No:	OPEN ELECTIVE		
Course Title:	Fundamentals of Robotics	Course Code:	A8382
Course Outcome No.	Course Outcome Statement		
A8382.1	Illustrate the basic concepts and components of a robotic system		
A8382.2	Select appropriate actuators and sensors for designing robot mobility system		
A8382.3	Solve transformation problems to describe the robot position and orientation of robot		
A8382.4	Apply the concepts of robot work cell design and control		
A8382.5	Choose appropriate robots for various applications suitable to modern manufacturing systems		
Semester No:	OPEN ELECTIVE		
Course Title:	3D Printing	Course Code:	A8383
Course Outcome No.	Course Outcome Statement		
A8383.1	illustrate the fundamental concepts of Additive Manufacturing and 3-D printing, its advantages and limitation		
A8383.2	Apply engineering knowledge, techniques, skills and modern tools to analyse problems in 3D Printing		
A8383.3	Appraise additive manufacturing through 3d printing		
A8383.4	Solve Complex manufacturing problems for significant technological and societal development		
A8383.5	Evaluate engineering products using the knowledge of mathematics, science, engineering and IT tools		
Semester No:	OPEN ELECTIVE		
Course Title:	Digital Electronics	Course Code:	A8402
Course Outcome No.	Course Outcome Statement		
A8402.1	Apply Boolean algebra and minimization techniques to simplify a Boolean function.		
A8402.2	Build combinational circuits using logic gates		
A8402.3	Analyse the behaviour of latches and flip-flops for designing sequential logic		
A8402.4	Construct synchronous sequential circuits using flip-flops and combinational logic.		
A8402.5	Make use of Programmable Logic Devices in the design of digital systems.		
Semester No:	OPEN ELECTIVE		
Course Title:	Basic Electronics	Course Code:	A8481
Course Outcome No.	Course Outcome Statement		
A8481.1	Analyse the operation and characteristics of electronic devices.		
A8481.2	Construct electronic circuits making use of diodes and transistors.		
A8481.3	Analyse single stage amplifiers using small signal low frequency		

	transistor model.		
A8481.4	Analyse the effect of negative and positive feedback on amplifiers.		
A8481.5	Design single stage amplifier for given specifications.		
Semester No:	OPEN ELECTIVE		
Course Title:	Principles of Communication Engineering	Course Code:	A8482
Course Outcome No.	Course Outcome Statement		
A8482.1	Summarize the fundamental concepts and acquire competencies for each topic of analog and digital modulation techniques.		
A8482.2	Illustrate elements of analog, digital and data communications systems and identify their real-time applications.		
A8482.3	Compare analog and digital communication systems with respect to performance parameters and applications.		
A8482.4	Analyse the error control and coding techniques including Source Coding Technique, Huffman Source Coding, Error Control, and Coding.		
A8482.5	Distinguish the features of advanced communication systems.		
Semester No:	OPEN ELECTIVE		
Course Title:	Fundamentals of IoT	Course Code:	A8483
Course Outcome No.	Course Outcome Statement		
A8483.1	Identify the basic building blocks and its characteristics.		
A8483.2	Determine the most appropriate IoT Devices and Sensors based on Application		
A8483.3	Make use of Python standard libraries for implementing various IoT Applications		
A8483.4	Analyse the appropriate protocol for establishing communication between various IoT Devices.		
A8483.5	Interpret cloud infrastructure, services, APIs and architectures of commercial and industrial cloud platform		
Semester No:	OPEN ELECTIVE		
Course Title:	Introduction to Embedded Systems	Course Code:	A8484
Course Outcome No.	Course Outcome Statement		
A8484.1	Classify the embedded systems based on the performance, complexity and the era in which they evolved		
A8484.2	Understand different factors to be considered for the selection of memory, sensors, actuators and their interfacing.		
A8484.3	Apply the fundamentals of microcontroller to investigate existing designs.		
A8484.4	Demonstrate assembly language programming to assemble and driver circuitry to microcontroller I/O ports to interface externa		
A8484.5	Develop a product with functional requirements using optimal hardware and software components.		
Semester No:	OPEN ELECTIVE		
Course Title:	Operating Systems	Course Code:	A8510
Course Outcome No.	Course Outcome Statement		
A8510.1	Identify the services provided by the operating system for user and system.		
A8510.2	Examine the concepts of IPC and Synchronization for process		

	cooperation		
A8510.3	Make use of Memory Management techniques for efficient use of main memory		
A8510.4	Select File and Disk Management methods for effective storage and access.		
A8510.5	Identify a Deadlock Handling Method in allocating resources among processes.		
Semester No:	OPEN ELECTIVE		
Course Title:	Database Management Systems	Course Code:	A8514
Course Outcome No.	Course Outcome Statement		
A8514.1	Design a database for a given problem using E-R diagrams and Relational Model.		
A8514.2	Construct Queries in Relational algebra and SQL for a case study.		
A8514.3	Use Normalization techniques to reduce data redundancy in data base.		
A8514.4	Select transaction control and recovery methods to keep data base consistent		
A8514.5	Compare various indexing techniques and NoSQL databases for efficient access		
Semester No:	OPEN ELECTIVE		
Course Title:	Software Engineering	Course Code:	A8520
Course Outcome No.	Course Outcome Statement		
A8520.1	Identify the design issues and process models to develop a software.		
A8520.2	Determine the functional and nonfunctional requirements with appropriate validation for a software product.		
A8520.3	Develop software design documents for the given requirements.		
A8520.4	Prepare test documents at various stages to validate project.		
A8520.5	Illustrate the need of quality management and metrics for product standardization		
Semester No:	OPEN ELECTIVE		
Course Title:	Information Security	Course Code:	A8607
Course Outcome No.	Course Outcome Statement		
A8607.1	Recognize various security threats, services, mechanisms, and classical encryption techniques.		
A8607.2	Apply classical encryption algorithms (Substitution and Transposition ciphers) and DES, AES algorithms to encrypt plain text.		
A8607.3	Explain various key management techniques, exemplifying RSA and Diffie Hellman.		
A8607.4	Examine the problems of authentication techniques (SHA, Digital signature).		
A8607.5	Analyse different symmetric key distribution and understanding of various authentication applications		
Semester No:	OPEN ELECTIVE		
Course Title:	Java Programming	Course Code:	A8608
Course Outcome No.	Course Outcome Statement		
A8608.1	Make use of various constructs to write a console application.		
A8608.2	Use principles of OOP to develop real time applications.		
A8608.3	Identify the need of exception handling to deal with runtime errors.		

A8608.4	Build applications for parallel processing using Multithreading.		
A8608.5	Choose Collection framework and I/O to manipulate and store data.		
Semester No:	OPEN ELECTIVE		
Course Title:	Ethical Hacking	Course Code:	A8651
Course Outcome No.	Course Outcome Statement		
A8651.1	Use the various security tools to assess the computing system.		
A8651.2	Identify the vulnerabilities across any computing system using penetration testing		
A8651.3	Choose a prediction mechanism to prevent any kind of attacks.		
A8651.4	Make use of Metasploit tool to probe systematic vulnerabilities on networks and servers.		
A8651.5	Identify the wireless network flaws and fill security patches in web access		
Semester No:	OPEN ELECTIVE		
Course Title:	Cyber Security	Course Code:	A8652
Course Outcome No.	Course Outcome Statement		
A8652.1	Identify the cybercrimes and offences in network accesses.		
A8652.2	Interpret the criminal plans before going to attack.		
A8652.3	Choose various security measures on mobile devices for a given scenario and make an effective report.		
A8652.4	Identify the various methods and tools in Cyber Crime.		
A8652.5	Examine various defence and analysis techniques to protect our information from attackers		
Semester No:	OPEN ELECTIVE		
Course Title:	Blockchain Technology	Course Code:	A8656
Course Outcome No.	Course Outcome Statement		
A8656.1	Identify the basic concepts of block chain to process data		
A8656.2	Make use of Bitcoin as cryptocurrency		
A8656.3	Choose Ethereum block chain for security		
A8656.4	Design smart contracts as per the requirements and deploy on Test networks.		
Semester No:	OPEN ELECTIVE		
Course Title:	Robotic Process Automation	Course Code:	A8658
Course Outcome No.	Course Outcome Statement		
A8658.1	Discuss use of RPA platform and its components.		
A8658.2	Apply sequence and control flows as per the requirements.		
A8658.3	Analyse data manipulation concepts to solve real time problems.		
A8658.4	Illustrate user interface explorer and handle events.		
A8658.5	Demonstrate scenario of handling the errors and exceptions and benefits of RPA.		
Semester No:	OPEN ELECTIVE		
Course Title:	E-Commerce	Course Code:	A8681
Course Outcome No.	Course Outcome Statement		
A8681.1	Elaborate the components and roles of the E-Commerce environment.		

A8681.2	Estimate how to sell products and services on the web as well as to meet the needs of website visitors.		
A8681.3	Analyse the impact of E-commerce on business models and strategy.		
A8681.4	Create a portfolio of the steps required to start-up an on-line business.		
A8681.5	Interpret legal and ethical issues related to E-Commerce and web marketing approaches.		
Semester No:	OPEN ELECTIVE		
Course Title:	Full Stack Development	Course Code:	A8682
Course Outcome No.	Course Outcome Statement		
A8682.1	Demonstrate the fundamentals of scripting languages & non - scripting languages and its differences.		
A8682.2	Use reacts concepts to design forms.		
A8682.3	Use different node.js modules to connect with database.		
A8682.4	Build web application using Node.js.		
Semester No:	OPEN ELECTIVE		
Course Title:	Artificial Intelligence	Course Code:	A8702
Course Outcome No.	Course Outcome Statement		
A8702.1	Apply AI techniques to solve game playing theorem proving and machine learning.		
A8702.2	Apply the propositional logic to AI designs.		
A8702.3	Learn different playing and reinforcement learning techniques		
A8702.4	Examine the role of searching strategies in AI environment		
A8702.5	Analyse the constraint satisfaction problems for problem solving.		

Semester No:	OPEN ELECTIVE		
Course Title:	Computer Organization and Architecture	Course Code:	A8781
Course Outcome No.	Course Outcome Statement		
A8781.1	Identify various functional aspects of computer hardware.		
A8781.2	Choose various instructions and addressing modes to execute an instruction.		
A8781.3	Make use of integer and floating-point algorithms to perform arithmetic operations on data.		
A8781.4	Design control unit and memory for a computer system.		
A8781.5	Examine the performance of a system using pipelining and multiprocessors.		
Semester No:	OPEN ELECTIVE		
Course Title:	Data Science for Engineers	Course Code:	A8851
Course Outcome No.	Course Outcome Statement		
A8851.1	Identify the various requirements for data science process.		
A8851.2	Choose an appropriate database required for processing data.		
A8851.3	Demonstrate the data science methodology and text mining approaches.		
A8851.4	Make use of data science tools to visualize the insights of data.		

Semester No:	OPEN ELECTIVE		
Course Title:	Computer Organization and Architecture	Course Code:	A8781
Course Outcome No.	Course Outcome Statement		
A8851.5	Apply various data visualization techniques using Tableau over Google Sheets.		
Semester No:	OPEN ELECTIVE		
Course Title:	Mathematical Programming	Course Code:	A8081
Course Outcome No.	Course Outcome Statement		
A8081.1	Identify LPP and express in mathematical form to solve by graphical or simplex method.		
A8081.2	Apply artificial variable techniques to obtain the optimal solution of an LPP.		
A8081.3	Interpret various methods under transportation model to get optimal results.		
A8081.4	Solve travelling salesmen problem using Hungarian method.		
A8081.5	Develop various replacement and sequencing models to arrive at an optimal decision.		
Semester No:	OPEN ELECTIVE		
Course Title:	Transform Calculus	Course Code:	A8082
Course Outcome No.	Course Outcome Statement		
A8082.1	Formulate series solutions of ordinary differential equations.		
A8082.2	Develop Fourier series for different types of functions.		
A8082.3	Apply Fourier Transform to connect the time and frequency domain.		
A8082.4	Analyse Z-transform and discrete signals to solve equations.		
A8082.5	Apply Laplace transforms to solve integral equations.		

Semester No:	OPEN ELECTIVE		
Course Title:	Numerical Techniques	Course Code:	A8083
Course Outcome No.	Course Outcome Statement		
A8083.1	Apply numerical methods to obtain approximate solutions of algebraic and transcendental equations		
A8083.2	Make use of interpolation techniques to find approximate values and derivatives of the function at intermediate p		
A8083.3	Compute an approximate value of a definite integral using numerical integration		
A8083.4	Construct curve of best fit for the experimental data using method of least squares		
A8083.5	Select an appropriate numerical method to solve ordinary and partial differential equation		
Semester No:	OPEN ELECTIVE		
Course Title:	Entrepreneurship Development	Course Code:	A8084
Course Outcome No.	Course Outcome Statement		
A8084.1	Identify the role, characteristics, qualities and functions of entrepreneur.		

A8084.2	Interpret various Institutional supports for setting up a business enterprise.		
A8084.3	Illustrate role, importance and functions of women entrepreneur.		
A8084.4	Infer the concept of Project Management and steps in Project development.		
A8084.5	Indicate training programs and different training institutions to impart training.		
Semester No:	OPEN ELECTIVE		
Course Title:	Logistics and Supply Chain Management	Course Code:	A8085
Course Outcome No.	Course Outcome Statement		
A8085.1	Understand the cyclical perspective of logistics and supply chain process.		
A8085.2	Learn about the distribution, transportation, warehousing related issues and challenges in supply chain.		
A8085.3	Appreciate the significance of network design in the supply chain.		
A8085.4	Gain knowledge of various models/tools of measuring the Supply Chain Performance		
A8085.5	Appreciate the role of coordination and technology in supply chain management.		
Semester No:	OPEN ELECTIVE		
Course Title:	Management Science	Course Code:	A8086
Course Outcome No.	Course Outcome Statement		
A8086.1	Explain and infer the concepts and aspects of management.		
A8086.2	Analyse the contributions of management, organizational structures, plant layouts, work study tools for enhancement of productivity in an organization		
A8086.3	Apply the project management techniques to decide the optimum time and cost for completion of a project.		
A8086.4	Apply statistical quality control & Inventory control techniques to manage and control products and materials.		
A8086.5	Use Human resource management techniques for better people management.		
Semester No:	OPEN ELECTIVE		
Course Title:	Human Resource Management	Course Code:	A8087
Course Outcome No.	Course Outcome Statement		
A8087.1	Identify the functions of Human Resource Management.		
A8087.2	Illustrate the process of Recruitment and selection.		
A8087.3	Analyse the needs and methods of training.		
A8087.4	Appraise the functional relationship with performance compensation and employee welfare.		
A8087.5	Examine the significance of employee relations.		
Semester No:	OPEN ELECTIVE		
Course Title:	Organizational Behaviour	Course Code:	A8088
Course Outcome No.	Course Outcome Statement		
A8088.1	Analyse the Concepts and models of Organizational Behaviour and Contemporary challenges		
A8088.2	Analyse the relevance of planning and decision-making process for the		

	development of the organisation.		
A8088.3	Identify various organisation design and control technique for better performance of the company.		
A8088.4	Examine the relevance of Individual and group behaviour in an organization and the role of Culture and dynamics		
A8088.5	Apply the theories of leadership and motivation to lead people to attain the organisation goals.		
Course Title:	Intellectual Property Rights	Course Code:	A8089
Course Outcome No.	Course Outcome Statement		
A8089.1	Identify the different types of intellectual property, agencies and treaties that protect intellectual property rights		
A8089.2	Classify the protectable matter of intellectual property rights.		
A8089.3	Analyse and evaluate the procedures involved in submission of application for the grant of intellectual property rights		
A8089.4	Interpret Trade secret law, liability for misappropriations of trade secrets, protection for submission, and trade secret litigation		
Course Title:	Professional Practice, Law and Ethics	Course Code:	A8090
Course Outcome No.	Course Outcome Statement		
A8090.1	Apply the concepts of professional practice, Law and Ethics in their personal lives and professional careers.		
A8090.2	Analyse Arbitration, Conciliation and Alternative Dispute Resolution system		
A8090.3	Interpret Law relating to Intellectual property		
A8090.4	Apply the rights and responsibilities as an employee, team member in any organization as a global citizen		
course Title:	National Cadet Corps (NCC)	Course Code:	A8091
Course Outcome No.	Course Outcome Statement		
A8091.1	Acquire knowledge of the history of NCC, its organization, and incentives of NCC for their career prospects and duties & conduct of ncc cadets.		
A8091.2	Imbibe good leadership traits and apply them in practical life and appreciate the visible outcome of leadership and motivation.		
A8091.3	Develop a sense of responsibility, smartness in appearance and improve self-confidence, inculcate importance of empathizing with others, improve their deep-thinking ability and apply ideas and be able to face problems in a constructive manner with solutions.		
A8091.4	Learn about the various natural resources, their utilization and practice method of conservation of these resources in daily life.		
A8091.5	Appreciate value of physical and mental health in daily life and spread awareness about treatment and care of wounds in their society.		
A8091.6	Understand individual responsibilities & role in meetings the security challenges on Border/Coastal areas.		
Semester No:	IV B. Tech II Sem		
Course Title:	Project Work Phase - II	Course Code:	A8043
Course Outcome No.	Course Outcome Statement		
A8043.1	Apply professional and basic concepts and procedures in ways that are appropriate for their main areas of study.		
A8043.2	Demonstrate proficiency and awareness of current technology and data tools and procedures related to the topic of study.		

A8043.3	Determine the complexity of the issue, perform an essential insight, and arrive at original solutions using the scope of an ongoing critical study.
A8043.4	Demonstrate an understanding of it and compliance to relevant personal, social, and professional moral values
A8043.5	Utilize the skills, discipline, and dedication to excellence required for lifelong learning

HOD, CSE