SNDT Women's University

Usha Mittal Institute of Technology

Name of Program: Bachelor of Technology

Name of Course: Computer Science and Technology (CST)

Program Outcomes
PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and engineering specialization to the solution of complex engineering problems.
PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
Program Specific Outcomes

At the end of the program, the student:

PSO1. Should be able to understand the concepts and demonstrate knowledge in the field of Data structures and algorithms, Computer Networks, Data base management systems, Operating Systems, Image Processing, Deep Learning, Data Science and Data analytics.

PSO2. Should be able to design projects using modern design tools to associate the learning from the courses to arrive at solutions to real world problems.

PSO3. Will be able to use research based knowledge and research methods for investigation and analysis of Complex problem.

PSO4. Should posses the skills to communicate in both oral and written forms, the work already done and the future plans with necessary road maps, demonstrating the practice of professional ethics and the concerns for societal and environmental wellbeing.

Course Outcomes

Semester-I

Course Code	Course Name	Course Outcomes
BasicSciencecourse (BSC101)	AppliedScience (Physicsand Chemistry)	1 Learn about electric and magnetic fields. 2. Learn about scaler and vector fields. 3. Maxwell's equations that define basic laws of electromagnetism. ● Propagation of electromagnetic waves through free space(Vacuum or Non conducting media). 4.Analyse atomic and molecular structure in terms of wavefunctions, charge densities and energy level diagrams. 5. Obtain quantitative information about energy levels through molecular spectroscopic methods such as electronic, vibrational, rotational and nuclear magnetic resonance (NMR) spectroscopy. 6. Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity
Basic Science course (BSC103)	Mathematics–I	The students will learn: 1. To apply differential calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions. 2. The fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems. 3. The tool of power series and Fourier series for learning advanced Engineering Mathematics. 4. To deal with functions of several variables that are essential in most branches of Engineering. 5. The essential tool of matrices and linear algebra in a comprehensive manner.
EngineeringScience Courses	Basic Electrical Engineering	1. To understand and analyze basic electric and magnetic circuits 2. To study the working principles of electrical

Course Code	Course Name	Course Outcomes
(ESC101)		machines 3. To introduce the components of low voltage electrical installations
Engineering Science Courses (ESC102)	Engineering Graphics& Design	1. To prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability 2. To prepare you to communicate effectively 3. To prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice
	Applied Science Lab	The physics and chemistry laboratory course will consist of experiments illustrating the principles of physics and chemistry relevant to the study of science and engineering. The students will learn to: 1. Analyze& generate experimental skills 2. Learn and apply basic techniques used in chemistry laboratory for preparation, purification and identification. 3. Employ the basic techniques used in chemistry laboratory for analyses suchas chromatography, spectroscopy, volumetric titrations, conductometry. 4. Learn safety rules in the practice of laboratory investigations.
	Basic Electrical Engineering Lab	Get an exposure to common electrical components and their ratings. 1. Make electrical connections by wires of appropriate ratings. 2. Understand the usage of common electrical measuring instruments. 3. Understand the basic characteristics of transformers and electrical machines. 4. Get an exposure to the working of power electronic converters.
	Engineering Graphics Design	Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software
	Induction Program	
Semester-II		
Course Code	**Course Name**	**Course Outcomes**
Basic Science course (BSC102)	Applied Science (Physics and Chemistry)	1. Imparted knowledge about simple harmonic oscillations, mechanical and electric oscillators. 2. Learn about different kinds of damping in harmonic oscillators. Learn about non dispersive transverse and longitudinal waves in one dimension, acoustic waves and sound waves. 3. Know about interference and diffraction phenomena. They

		will also learn about Michelson Interferrometer (also learn why the result was negative. Learn about why they found no significant difference between the speed of light in the direction of movement through the presumed aether, and the speed at right angles. 4. Understand how Young's double slit experiment and diffraction grating work. 5. Interaction of radiation with matter, Einstein coefficients , working of different types of Lasers and their application in science, engineering and medicine. 6. Rationalise bulk properties and processes using thermodynamic considerations. 7. Understand the energies existing in a bulk macroscopic system. List major chemical reactions that are used in the synthesis of molecules. 8. Rationalize the terms and concepts involved in Stereochemistry like symmetry operations, chirality, isomerism etc.
Basic Science course (BSC104)	Mathematics-II	1. The mathematical tools needed in evaluating multiple integrals and their usage. 2. The effective mathematical tools for the solutions of differential equations that model physical processes. 3. The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.
Engineering Science Courses (ESC103)	Programming for Problem Solving	1. To formulate simple algorithms for arithmetic and logical problems. 2. To translate the algorithms to programs (in C language). 3. To test and execute the programs and correct syntax and logical errors. 4. To implement conditional branching, iteration and recursion. 5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach. 6. To use arrays, pointers and structures to formulate algorithms and programs. 7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems. 8. To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.
Engineering Science Courses (ESC104)	Workshop/Manufacturing Practices	Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.
Humanitie	English	After completing this course, students will

sandSocial Sciencesincluding Managementcourses HSM (101)		1. Acquire basic proficiency in English grammar and vocabulary 2. Develop good writing skills 3. Demonstrate skills requires for presentations 4. Acquire skills to participate in interview
	Applied Science Lab	The students will learn to: 1. Estimate rate constants of reactions from concentration of reactants/products as a function of time 2. Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc 3. Synthesize a small drug molecule and analyse a salt sample
	Programming for Problem Solving Lab	1. To formulate the algorithms for simple problems 2. To translate given algorithms to a working and correct program 3. To be able to correct syntax errors as reported by the compilers 4. To be able to identify and correct logical errors encountered at run time 5. To be able to write iterative as well as recursive programs 6. To be able to represent data in arrays, strings and structures and manipulate them through a program 7. To be able to declare pointers of different types and use them in defining self referential structures. 8. To be able to create, read and write to and from simple text files.
	Workshop /Manufacturing Practices Lab English Practical	1. Upon completion of this laboratory course, students will be able to fabricate components with their own hands. 2. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes. 3. By assembling different components, they will be able to produce small devices of their interest.
	English Practical	The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
	Environmental Sciences	After completing this course, students will be able to 1. Apply the basic knowledge of environmental protection, sustainable development and improvement. 2. Categorize and scrutinize impact of human development on natural resources. Provide the student with an understanding

		of radioactive waste.
		3. Interpret the impact of environmental problems on socio economic growth and humanhealth.
		4. Apply various strategies, technological improvement, and methods for sustainable management of environmental systems and for the remediation of degraded environment.
		5. Apply different Science and Technology (S&T) based sustainability solutions and limitations as well as to identify impact of human population on the natural environment and human health.

Semester-III

Course Code	Course Name	Course Outcomes
PCC-CS401443 411	Analog Electronic Circuits	1. Understand the characteristics of transistors 2. Design and analyse various rectifier and amplifier circuits. 3. Design sinusoidal and non-sinusoidal oscillators. 4. Understand the functioning of OP-AMP and design OP-AMP based circuits.
PCC-CS 301343411	Data structure & Algorithms	1. For a given algorithm student will able to analyze the algorithms to determine the time and space complexity and justify the correctness. 2. For a given Search problem (Linear Search, Binary Search & hashing) student will able to implement it. 3. For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity. 4. Compare and contrast the benefits of dynamic and static data structures implementations. 5. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity. 6. Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.
ESC 302343412	Digital Electronics	1)Able to understand the basics concepts and techniques used in digital electronics. 2)Understand and examine the structure of various number systems and its application in digital design. 3)The ability to understand, analyze and design various combinational and sequential circuits. 4)Ability to identify basic requirements for a design application and propose a cost effective solution. 5)Able to understand Memory Units and recognizes the properties of memory units.
PCC-	IT Workshop (Sci	1)Understand the fundamental concepts of Matlab/Octave.

CS302343 413	Lab/Octave/MATLAB)	2)Understand the syntax and semantics of Matlab/Octave. 3)Understand the fundamental abstractions in procedural programming - variables/values/types, assignment, control flow (conditionals/loops/error handling) 4)Understand the Octave specific compound data types -vectors, matrices, cell arrays and the basic linear algebra underlying them (linear maps, matrix multiplication, factorization)
BSC 301313411	Mathematics-III (Probability and Statistics)	1. The ideas of probability and random variables and various discrete and continuous probability distributions and their properties. 2. The basic ideas of statistics including measures of central tendency, correlation and regression.
323421	Analog Electronic Circuits Lab	1. To study and understand the various types of circuits used in Integrated Circuits 2. To understand the design various linear circuit mathematical , loigical functions such as addition, substractions, AND/OR etc operations 3. Design of analog filters, regulators, oscillators, etc. 4. Design of implementation of A/D and D/A circuits
343421	Data structure & Algorithms Lab	1. Design and implement algorithms to solve problems. 2. Choose efficient data structures (Linear & Non-Linear) and apply them to solve problems. 3. Design & implement different searching & sorting algorithms using appropriate data structures. 4. Analyze the efficiency of programs based on time complexity. 5. Prove the correctness of a program using loop invariants, pre-conditions and post-conditions in programs.
343422	Digital Electronics Lab	1. Learn the basics of gates. 2. Construct basic combinational circuits and verify their functionalities. 3. Apply the design procedures to design basic sequential circuits. 4. Learn about counters. 5. Learn about Shift registers. 6. To understand the basic digital circuits and to verify their operation.
343423	IT Workshop (Sci Lab/MATLAB) Lab	1)Able to understand the fundamental concepts of Scientific Programming using Matlab/Octave. 2)Understand the syntax and semantics of Matlab/Octave. 3)Understand the fundamental abstractions in procedural programming - variables/values/types, assignment, control flow (conditionals/loops/error handling) 4)Understand the Octave specific compound data types -vectors, matrices, cell arrays and the basic linear algebra underlying them (linear maps, matrix multiplication, factorization) 5)Able to carry out simple numerical computations and analyses

		using Octave. 6)Able to design simple algorithms to solve problems and write a simple program in Octave to solve scientific and mathematical problems.

Semester-IV

Course Code	Course Name	Course Outcomes
PCC-CS401443 411	Discrete Mathematics	1. Mathematical reasoning: Students are expected to use mathematical reasoning in order to read, comprehend, and construct mathematical arguments. Students will learn basic concepts of mathematical logic and proof. 2. Combinatorial analysis: Students will count or enumerate objects and perform combinatorial analysis. 3. Discrete structures: Students will learn the basic concepts of sets, permutations, relations, poset, graphs, trees. 4. Algebraic structures: Students will learn the concepts of algebraic structures and its properties like homomorphism, isomorphism. 5. Groups, Rings: Students are expected to learn different algebraic structures like semigroups, groups, monoid, rings, field, boolean algebra.
PC-CS 402 423411	Computer Organization & Architecture	1. How Computer Systems work & the basic principles 2. Instruction Level Architecture and Instruction Execution 3. The current state of art in memory system design 4. How I//O devices are accessed and its principles 5. Concepts of advanced pipelining techniques
PCC-CS403443 412	Operating Systems	1. To learn and understand the fundamentals of Operating Systems.Create processes and threads. 2. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time. 3. For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time. 4. Design and implement a file management system. 5. For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.
PCC-CS404443 413	Design & Analysis of Algorithms	1. For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms. 2. Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.

		3. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation. 4. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming and develop the dynamic programming algorithms, and analyze it to determine its computational Complexity. 5. For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems.
HSMC 401433411	Management 1 (Organizational Behaviour/ Finance & Accounting)	1) Understand fundamental principles of Accounting 2) Identify the main financial statements and their purposes. 3) Complete a Project/ Written Assignment that integrates career orientation and or professional development skills. 4)Develop the ability to use accounting information to solve a variety of business problems 5) The course will help understand and learn the accounting documents, system and procedure.
MC483451	Constitution of India	After completing this course, students will be able to 1. Understand the constitutional framework and state and central policies 2. Display awareness of fundamental right and duties of a citizen 3. Demonstrate awareness about engineering ethics and responsibilities of an engineer 4. Display awareness about human rights in India
423421	Computer Organization & Architecture Lab	1. Components of CPU: Students are expected to identify and assemble CPU 2. Number Representation and Conversion: Students are expected to write programs to convert numbers from binary and hexadecimal number systems. 3.MIPs Assembly Language: Students are expected to write the basic programs of MIPs Assembly Language using Vlab 4. Adder: Students are expected to build and do the binary addition using half adder and full adder in VLAB 5. Memory and CPU Design: Students are expected to design memory module, ALU and CPU using VLAB
443422	Operating Systems Lab	1. Study of Kernel and their types. 2. Implementing Scheduling algorithms like FCFS,SJF,RR,Priority based scheduling algorithm. 3. Implementing memory management algorithm like First fit,Best fit,Worst fit 4. Study of Various case studies of operating System like UNIX, LINUX,Windows series etc.

Course Code	Course Name	Course Outcomes
443423	Design & Analysis of Algorithms Lab	1. Design and implement recursive algorithms to solve problems of recursive nature. 2. Understand the problem, identify appropriate algorithm design strategy that suits it and then solve the problem using that strategy. 3. Analyse the algorithm after implementing it by using recurrence relation or Masters theorem for reducing functions or by dividing functions. 4. Design & implement searching & sorting algorithms by using appropriate algorithm design strategies and analyse them.

Semester- V

Course Code	Course Name	Course Outcomes
5161	Microprocessor & Micro controller	1. Study the Architechure of basic Microprocessors such as 8085/8085 and Microcontroller such as 8051/8751. 2. Study of opcode and programming for simple operations such as addition, substraction, multiplication etc 3. Study and interface various periferal devices to the processer and controllers. 4. Design of applications using processor/comtroller and peripheral devices for automations.
5121	Environmental Science	After completing this course, students will be able to 1. Apply the basic knowledge of environmental protection, sustainable development and improvement. 2. Categorize and scrutinize impact of human development on natural resources. Provide the student with an understanding of radioactive waste. 3. Interpret the impact of environmental problems on socio economic growth and human health. 4. Apply various strategies, technological improvement, and methods for sustainable management of environmental systems and for the remediation of degraded environment. 5. Apply different Science and Technology (S&T) based sustainability solutions and limitations as well as to identify impact of human population on the natural environment and human health.
5162	Object Oriented Methodology & Design	1. Knowledge of Object Oriented Concepts 2. Develop design skill of various Model gaining of application knowledge of UML tools 3. Develop problem solving skill 4. Dealing with complexity in the problem
5122	Computer Networks	1. To understand the basics of networking and protocols required in the field of Internetworking. 2. Students will be able to write the application based on networking and protocol concepts. 3. Understand working and interconnections of OSI layers 4. Understand application layer protocol and security issues in

		network.
5163	Discrete Time Signal Processing	1. Understand the concepts of discrete-time Fourier transform and fast Fourier transform. 2. Apply the knowledge of design of IIR digital filters to meet arbitrary specifications. 3. Apply the knowledge of design of FIR digital filters to meet arbitrary specifications. 4. Analyze the effect of hardware limitations on performance of digital filters. 5. Apply the knowledge of DSP processors for various applications.
5101	Communication Skills-II	After Completing this course, students will be able to 1. Design Technical documents with precision of language, vocabulary and style 2. Recognize attributes of a suitable candidate for a job by participating in resume writing, group discussions and interviews 3. Deliver formal presentations 4. Demonstrate Knowledge of Professional Ethics and Behaviour
5261	Microprocessor and Micro controller Lab	1. Perform various programmes using Opcode of Microprocessor and Microcontroller. 2. Implementation of various programmes using opcode and processor kits, such as addition, substraction, multiplication, for 8 and 16 bits. 3. Interfaccing various periferals of professor for applications such as 8255, 8253, 8271 8257 etc for various applications. 4. Interfacing the various devices such as display, drives, LED and control its operations.
5221	Computer Networks Lab	1.Understand Network topologies, physical layer components of computer networks 2.Implement Error detecting and correcting codes 3.Implement different routing algorithms 4. Implement different encryption/ decryption techniques
5262	Discrete Time Signal Processing lab	1. Study the basic architecture of Digital Signal Processor. 2. Study and analysis of various types of DSP systems. 3. Study and analysis of various transforms such as Z-transform, Fourier Transform, FFT. 4. Study and analysis of IIR and FIR filters and its implementation
5222	**UML** with Java	1.Practical knowledge of UML 2. Develop programming skill 3. Develop writing efficient program

		4. Design of Graphical User Interface

Semester- VI

6121	Data Mining and Data Warehousing	1. To know ETL and Management 2. Design of Data Model 3. Design of Data Warehouse 4. Knowledge of data mining process 5. To understand Online Analytical Processing (OLAP)
6122	Information and Cyber Security	1. Gaining knowledge of Security 2.Developing skill of writing secure program 3. knowing Network security 4. Awareness about cyber security and cyber crime
6161	Image processing	1. Understand basic concepts of digital Image processing, sampling, quantization 2. Calculate various transforms of an image 3. Enhance the image in spatial and frequency domain using point processing, histogram specification, various filtering techniques 4. Compress images by lossy and lossless techniques and compare their performance 5. Segment images and perform morphological operations on images and understand representation and description 6. Understand current trends in applications of image processing
6162	Software Engineering	Understand and demonstrate basic knowledge in software engineering. 2)Able to identify requirements, analyze and prepare models. 3)Able to plan, schedule and track the progress of the projects. 4)Able to design & develop the software projects. 5)Able to identify risks, manage the change to assure quality in software projects. 6)Able to apply testing principles on software projects and understand the maintenance concepts.
6123	Theoretical Computer Science	1. Identified finite autotmata and reguler language of theortical computer science 2. Analyze theorm for reguler expression and algorithems for reguler sets 3. classify context free language and different type of automata 4.Design machine and model for language in theoritical computer science 5.Application of finite automata
6124	Mobile Computing and Applications	1. To study and understand the various wireless network standards. 2. Study the Architechure of wireless Network technologies

		and systems
		3. To study and analyse the challenges for Mobile Computing.
		4. Intergrating the solutions of Mobile Computing with exhisting network.
		5. Applications of Mobile Computing.
6221	DMDW lab	1. To perform transformation of data
		2. Design of Star Schema
		3. Implementation of Data warehouse
		4. Writing OLAP queries
		5. To implement data mining techniques
6222	Information and Cyber Security Lab	1. Applying open source tools to achieve cyber security
		2. writing programs for maintaining confidentiality, Integrity, Authentication mechanism
		3. Awareness about Cyber Crime and prevention
		4. Developing security methods for data handling
6261	Image Processing Lab	1. Implement the sampling, quantization techniques
		2. Implementation of different point processing, and filtering techniques.
		3. Implementation of histogram equalization, transforms, compression, segmentation and morphological techniques
6329	Semester Project	1. Get acquainted to research methodology
		2. Survey and analyze the literature.
		3. Design , implement , analyze and test the project

Semester- VII

7521	Advanced Operating system and System Programming	1. To know the advanced OS concepts
		2. Various system calls and working
		3. Working of Kernel Module
		4. To understand OS interface
		5. To understand the File System and Management of OS
7561	Advanced database	1. Extended relationship model: Students are expected to understand the notion of EER model.Students are able to develop EER models for given problem statements.
		2. OODB and ORDB: Students will learn data storage methods usable for object-oriented program systems, including pure object database systems and object-relational mappers, its advantages and disadvantages.
		3. Distributed Database and XML: Students are expected to find the need of distributed databases. Students will be able to learn its types, query optimization, concurrency control protocols, web based databases.
		4. Active and Deductive Database: Students will learn models and methods of organization of deductive databases using Prolog. Students will be able to write triggers.
		5. Spatial Databases: Students will learn GIS and Spatial database models. Students will be able to identify design

		issues and spatial query language. Students will learn representation of spatial data, spatial data types, operators and indexing.
7522	Deep Learning	1. To study and understand the basics of Artificial Intellegence and Machine Learning. 2. Linear and non linear classification challenges and solutions 3. Study Architechure of Multilayer Perceptrons for various applications 4. Study and analyse Architechure for CNN 5. Study aand anaylse architechure for RNN 6. Study and analyse Architechure for Reinforcement Learning
7523	Compiler Construction	1. Identify the merits of Compiler Construction 2. Understand the working of Lexical Analysis 3. Understand the working of Parser 4. Generation of Intermediate code 5. Compiler Construction tools
7762	Elective-I (Data Science and Business Analytics)	Students are able to 1. To use mathematics, statistics, computer science to evaluate data and to extract valuable information for use in strategic decision making, product development, trend analysis and forecasting. 2. To apply quantitative modeling techniques and data analysis techniques to the solution of real world business problems, communicate findings, and effectively present results using data visualization techniques 3. To use the suitable algorithms for data analytics. 4. To use the appropriate data normalization technique.
7661	Advanced Databases Lab	1. PostgreSQL: Students are expected to create and use ADT abstract data types, user defined data types. 2. Inheritance and Partition: Students are expected to use inheritance commands, cascade dependency. 3. Triggers: Students are expected to develop and use triggers using Pg/Sql. 4. Spatial Database: Students are expected to use spatial data types and operators in PostgreSQL. XML database: Students are expected to use XML types and commands in XML
7622	Deep Learning Lab	
7621	Advanced OS and System Programming Lab	1. How to create Virtual Machine 2. How system calls gets executed 3. How RMI works 4. To know writing of Kernel Programming Script 5. Working of Lex and Yaacc tools
7862	Elective Lab-I (Data Science and	Students are able to 1. To use different techniques of data visualization.

	Business Analytics)	2. To use various statistical models for data analysis. 3. To do Big data analytics of data in various formats. 4. Learn how to preprocess the data. 5. How to extract the useful information from the large data.
7623	Compiler Construction Lab	1. Identify different Compiler Construction tools 2. Use of Lex and Flex 3. Use of Yaac and ANTLR 4. Working of Symbol Table 5. How the intermediate code gets generated
7921	Project (Stage I)	1. Able to gather knowledge over the field of research and design or plan about the proposed work. 2. Ability to locate and use technical information from multiple sources. 3. Able to perform a literature search to review current knowledge and developments in the chosen technical area. 4. Understand the software development cycle with emphasis on different processes - requirements, design, and implementation phases. 5. Able to work as a team and to focus on getting a working project done on time with each student being held accountable for their part of the project. 6. Able to deliver a seminar on the general area of work being undertaken and specific contributions to that field and prepare a formal re

Semester- VIII

8561	Cloud Computing	After successful completion of this course, student will be able to 1. Define Cloud Computing and memorize the different Cloud service and deployment models 2. Describe importance of virtualization along with their technologies. 3. Apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost. 4. Use and Examine different cloud computing services 5. Analyze the components of open stack & Google Cloud platform 6. Describe the key components of Amazon web Service , Google App Engine 7. Design & develop backup strategies for cloud data based on features.
8762	Elective-II(Big Data Analytics)	1)Able to Identify Big Data and its Business Implications. 2)Understand and work on Hadoop Framework and eco systems. 3)Understand and analyse Big Data using Map-reduce programming in Both Hadoop and Spark framework. 4)understand fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics.

		5)Ability to access and Process Data on Distributed File System. 6)Able to achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications
8661	Cloud Computing Lab	Students will able to: 1. Implement Virtualization using different types of Hypervisors 2. Study and implement Collaboration with different Software As Services 3. Describe steps to perform on demand Application delivery using Ulteo . 4. Examine the installation and configuration of Open stack cloud 5. Analyze and understand thefunctioning of different googleservices . 6. Implementation of Platform as a Service using Google App Engine 7. Design & Synthesize Storage as a service using own Cloud
8862	Elective II (Big Data Analytics) Lab	1. Able to download and install Hadoop on Windows and Ubantu. 2. Able to apply tools and techniques to analyze Big Data. 3. Able to design algorithms by employing Map Reduce technique for solving Big Data problems. 4. Able to point out problems associated with streaming data and handle them. 5. Able to design algorithms for link analysis and frequent itemset mining. 6. Able to design solutions for problems in Big Data by suggesting appropriate clustering techniques
8921	Project (Stage-II)	1. Able to demonstrate a sound technical knowledge of their selected project topic. 2. Able to design engineering solutions to complex problems utilising a systems approach. 3. Able to produce progress reports or maintain a professional journal to establish work completed, and to schedule additional work within the time frame specified for the project. 4. Able to deliver a seminar on the general area of work being undertaken and specific contributions to that field.
8922	Project (Stage- III)	1. Able to demonstrate a sound technical knowledge of their selected project topic. 2. Able to design engineering solutions to complex problems utilising a systems approach. 3. Able to produce progress reports or maintain a professional journal to establish work completed, and to schedule additional work within the time frame specified for the project. 4. Able to deliver a seminar on the general area of work being undertaken and specific contributions to that field.

		5. Prepare a formal report describing the work undertaken and results obtained so far. 6. Able to present the work in a forum involving poster presentations and demonstrations of operational hardware and software.