ADITYA ENGINEERING COLLEGE

An Autonomous Institutuion

Approved by AICTE ● Permanently Affiliated to JNTUK ● Accredited by NAAC with 'A' Grade
Recognised by UGC under sections 2(f) and 12(B) of UGC Act, 1956
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Department of Computer Science and Engineering

B.Tech - AR20 - Course Articulation Matrix

Note: Correlation Levels are 1 or 2 or 3.   Where 1 Slight(Low), 2 Moderate(Medium), 3 Substantial (High).

	CO Statements	POs												PSOs	
I SEM															
Course Code	**201HS1T01 - COMMUNICATIVE ENGLISH**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Identify the ways to overcome fear and use of words paradoxically, interpret the developing conditions and the core competences of the state to prioritize education system.	-	-	-	-	-	-	1	-	-	3	-	-	-	-
CO2	Explain about world's most precious natural resources.	-	-	-	-	-	-	1	-	-	3	-	-	-	-
CO3	Explain about importance of unity to abolish war.	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	Respond well to the changing situations in life with independent knowledge for better decision making.	-	-	-	-	-	-	-	-	2	3	-	2	-	-
CO5	Demonstrate writing and concepts of effective writing skills.	-	-	-	-	-	-	-	-	1	3	-	-	-	-
Course Code	**201BS1T01 - DIFFFERENTIAL EQUATIONS and LINEAR ALZEBRA**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Apply the concepts of Mean Value theorem, Partial Differentiation and identify the maxima and minima of a given function.	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Solve the linear differential equations and model various situations involving differential equations of first order.	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Solve linear differential equations of higher order and model various situations involving second order differential equations.	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Calculate Rank of a matrix and solve the system of Linear equations and find the Eigen values and Eigen vectors.	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Compute various powers of a matrix and identify the nature of the quadratic form.	3	2	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**201BS1T04 - ENGINEERING CHEMISTRY**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Compare the quality of drinking water and problems associated with hard water.	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Explain the fundamentals and applications of Electrochemical Energy Systems.	2	-	-	-	-	-	-	-	-	-	-	-	1	-
CO3	Explain the fundamentals and applications of Advance materials.	3	-	-	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs	
CO4	Explain about renewable energy sources and their manufacturing methods	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Summarize the importance of Nano materials and Green chemistry.	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**201ES1T02 -PROGRAMMING FOR PROBLEM SOLVING USING C**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Develop the basic programs in C and draw the flowcharts using Raptor.	2	3	-	-	1	-	-	-	-	-	-	2	1	-
CO2	Make use of conditional and iterative statements to solve real time scenarios in C.	3	2	-	-	2	-	-	-	-	-	-	2	2	-
CO3	Apply the concept of arrays, modularity and strings to handle complex problems.	2	2	3	-	2	-	-	-	-	-	-	1	2	-
CO4	Apply the dynamic memory allocation functions using pointers.	2	3	-	-	2	-	-	-	-	-	-	2	2	-
CO5	Develop programs using structures, and Files.	3	2	2	-	-	-	-	-	-	-	-	2	3	-
Course Code	**201ES1I02 - COMPUTER ENGINEERING WORKSHOP**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Identify the components of a PC, Assemble & disassemble the same.	3	1	-	-	-	-	-	-	-	-	-	-	3	3
CO2	Experiment with installation of Linux Operating System, Virtual machine and secure a computer from cyber threats	3	2	1	-	3	-	-	-	-	-	-	-	3	3
CO3	Summarize the fundamentals and architecture of IoT.	3	-	1	1	3	-	-	-	-	-	-	-	3	3
CO4	Prepare word documents; excel sheets and power point presentation	2	1	1	-	3	-	-	-	-	-	-	-	3	3
CO5	Develop presentation /documentation using Office tools and Latex.	3	2	1	1	3	-	-	-	-	-	-	-	3	3
Course Code	**201HS1L01 -COMMUNICATIVE ENGLISH LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Make use of the concepts to communicate confidently and competently in English Language in all spheres.	-	-	-	-	1	-	-	-	-	3	-	1	-	-
CO2	Express Creative skills to construct Dialogues / Conversations in Spoken and Written forms.	-	-	-	-	1	-	-	-	-	3	-	2	-	-
CO3	Identify Accent for intelligibility.	-	-	-	-	1	-	-	-	-	3	-	2	-	-
CO4	Demonstrate communicative ability in everyday Conversation, JAM Sessions and Public Speaking.	-	-	-	-	1	-	-	-	-	3	-	1	-	-
CO5	Demonstrate nuances of Language through Audio – Visual Experience and group activities.	-	-	-	-	1	-	-	-	-	3	-	1	-	-
Course Code	**201BS1L03 - ENGINEERING CHEMISTRY LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Demonstrate Complex metric titrations by volumetric analysis.	2	-	-	-	-	-	-	-	1	-	-	1	-	-
CO2	Demonstrate Acid – Base titrations by instrumental analysis.	2	-	-	-	-	-	-	-	1	-	-	1	-	-
CO3	Estimate Vitamin C using volumetric analysis	2	-	-	-	-	-	-	-	1	-	-	1	-	-
CO4	Prepare polymer like Bakelite.	2	-	-	-	-	-	-	-	1	-	-	1	1	-
CO5	Prepare alternative fuel like Bio-Diesel.	2	-	-	-	-	-	-	-	1	-	-	1	-	-

	CO Statements	POs												PSOs	
Course Code	**201ES1L02 - PROGRAMMING FOR PROBLEM SOLVING USING C LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Develop the basic programs in C and draw the flowcharts using Raptor.	2	1	-	-	3	-	-	-	-	2	-	-	2	-
CO2	Make use of conditional and iterative statements to solve real time scenarios in C.	3	2	-	-	-	-	-	-	-	-	1	2	3	-
CO3	Apply the concept of arrays, modularity and strings to handle complex problems.	3	2	-	-	-	-	-	-	-	-	1	2	3	-
CO4	Apply the dynamic memory allocation functions using pointers.	2	3	-	-	-	-	-	-	-	2	-	1	2	-
CO5	Develop programs using structures, and Files.	3	2	-	-	-	-	-	-	-	-	2	2	3	-
Course Code	**201MC1T01 - ENVIRONMENTAL SCIENCE**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Outline the natural resources and their importance for the sustenance of the life	-	-	-	-	-	1	2	-	-	-	-	-	-	-
CO2	Explain about the biodiversity of India, threats and its conservation methods	-	-	-	-	-	1	2	-	-	-	-	-	-	-
CO3	Illustrate various attributes of the pollution, impacts and measures to control the pollution along with waste management practices	-	-	-	-	-	1	2	-	-	-	-	-	-	-
CO4	Describe social issues of both rural and urban environment to combat the challenges and the legislations of India in environmental protection	-	-	-	-	-	1	2	-	-	-	-	-	-	-
CO5	Explain the population growth and its implications	-	-	-	-	-	1	2	-	-	-	-	-	-	-
II SEM															
Course Code	**201BS2T07 - NUMERICAL METHODS AND COMPLEX VARIABLES**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Apply numerical methods to obtain approximate solution of equations.	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Apply various numerical methods to interpolate polynomials.	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Apply numerical methods to initial value problems and problems involving integration.	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Identify the analyticity of functions of complex variables.	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Apply Cauchy's theorem, Cauchy's integral formula and Cauchy's residue theorem.	3	2	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**201BS2T09 - APPLIED PHYSICS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Apply the principles of interference and diffraction to design and enhance the resolving power of various optical instruments	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Explain the fundamental concepts of Quantum behavior of matter.	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Classify the solids based on energy band structure.	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Explain the basic concepts of Semi-Conductors and Identify the type of semiconductors using Hall Effect.	2	1	-	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs	
CO5	Explain about magnetic and dielectric properties of different materials.	3	2	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**201ES2T11 - COMPUTER ORGANIZATION**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Recognize and manipulate representations of numbers stored in digital computers.	3	2	-	-	3	-	-	-	-	-	-	-	1	-
CO2	Relate Postulates of Boolean algebra and minimize combinational functions.	2	1	-	-	2	-	-	-	-	-	-	-	2	-
CO3	Make Use of combinational and sequential circuits with simplified logic functions in various digital circuits.	3	2	1	1	2	-	-	-	-	-	-	-	2	-
CO4	Explain the Basic Computer Organization and Design	2	1	-	-	2	-	-	-	-	-	-	-	2	-
CO5	Describe the internal organization of computers, CPU, memory unit and Input/Outputs and the relations between its main components.	2	1	-	-	2	-	-	-	-	-	-	-	2	-
Course Code	**201ES2T04 - PYTHON PROGRAMMING**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Develop programs using fundamental concepts in python	2	2	3	-	-	-	-	-	-	-	-	2	2	-
CO2	Solve problems using control statements and string methods	2	2	3	-	-	-	-	-	-	-	-	2	3	-
CO3	Develop real time applications using data structures and functions	3	-	2	-	-	-	-	-	-	-	-	2	2	-
CO4	Apply Object Oriented Programming concepts and files	2	1	2	-	-	-	-	-	-	-	-	2	2	-
CO5	Build various applications using GUI and exceptions.	1	1	2	-	-	-	-	-	-	-	-	2	1	-
CO6	Explain the computer network fundamentals and reference models.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**201ES2T07 - DATA STRUCTURES THROUGH C**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Illustrate time and space complexities of an algorithm.	-	3	2	2	-	-	-	-	-	-	-	1	2	-
CO2	Apply various searching and sorting techniques to solve computing problems.	-	2	2	3	-	-	-	-	-	-	-	1	3	-
CO3	Make use of linear data structures to solve real time problems.	-	3	2	2	-	-	-	-	-	-	-	1	3	-
CO4	Develop applications using Tree Data Structures.	-	2	2	3	-	-	-	-	-	-	-	1	3	-
CO5	Solve problems using Graph Algorithms.	-	3	2	2	-	-	-	-	-	-	-	1	3	-
Course Code	**201BS2L04 -APPLIED PHYSICS LAB**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Use spectrometer, travelling microscope for making measurements	3	2	-	-	-	-	-	-	3	-	-	1	-	-
CO2	Determine energy gap of a semiconductor, draw characteristic curves to estimate thermal coefficient of a thermistor, Zener diode.	2	2	-	-	-	-	-	-	3	-	-	1	-	-
CO3	Determine the dielectric constant and resistivity.	3	1	-	-	-	-	-	-	3	-	-	1	-	-
CO4	Determine wavelength of source and width of the narrow slits.	3	2	-	-	-	-	-	-	3	-	-	1	-	-
CO5	Find the strength of magnetic field.	3	2	-	-	-	-	-	-	3	-	-	1	-	-
Course Code	**201ES2L06 - DATA STRUCTURES THROUGH C LAB**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Develop programs using recursive functions.	-	3	2	2	-	-	-	-	-	-	-	1	2	-

	CO Statements	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
						POs								PSOs	
CO2	Apply various searching and sorting techniques to solve computing problems.	-	2	2	3	-	-	-	-	-	-	-	1	2	-
CO3	Develop programs for implementing various operations on linear data structures.	-	3	2	2	-	-	-	-	-	-	-	1	2	-
CO4	Analyze various basic operations of Binary tree and Binary search tree to improve the efficiency.	-	2	2	3	-	-	-	-	-	-	-	1	2	-
CO5	Develop solution for problems using Graph Algorithms.	-	3	2	2	-	-	-	-	-	-	-	1	2	-
Course Code	201ES2L14 - PYTHON PROGRAMMING LAB	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Develop programs using conditional and iterative statements	-	2	3	-	2	-	-	-	-	-	-	2	1	-
CO2	Make use of different data structures in solving complex problems.	-	2	3	-	2	-	-	-	-	-	-	2	3	-
CO3	Apply the concepts of functions and files in solving real time applications	-	2	2	-	3	-	-	-	-	-	-	2	2	-
CO4	Build applications for handling exceptions.	-	1	2	-	3	-	-	-	-	-	-	2	2	-
CO5	Develop GUI applications.	-	1	2	-	3	-	-	-	-	-	-	2	2	-
Course Code	201MC2L01 - PROFESSIONAL COMMUNICATION SKILLS LAB	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Make effective use of Body language in all situations and contexts to enhance effective communication in all aspects.	-	-	-	-	-	-	-	-	-	3	-	2	-	-
CO2	Identify communicative competency to respond to others in different situations.	-	-	-	-	-	-	-	-	-	3	-	2	-	-
CO3	Make use of effective delivery strategies to select, compile and synthesize information for oral presentation.	-	-	-	-	-	-	-	-	-	3	-	2	-	-
CO4	Demonstrate in mock interviews, group discussion and public speaking.	-	-	-	-	-	-	-	-	-	3	-	2	-	-
CO5	Illustrate interpersonal skills using English language confidently and effectively for personal and professional growth.	-	-	-	-	-	-	-	-	-	3	-	2	-	-
Course Code	201MC2T02 - CONSTITUTION OF INDIA	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Explain historical background of the constitution making and its importance for building a democratic India.	-	-	-	-	-	1	-	-	-	-	-	-	-	-
CO2	Compare the functioning of three wings of the government i.e., executive, legislative and judiciary.	-	-	-	-	-	1	-	-	-	-	-	-	-	-
CO3	Interpret the value of the fundamental rights and duties for becoming good citizen of India.	-	-	-	-	-	1	-	-	-	-	-	-	-	-
CO4	Compare the decentralization of power between central, state and local self- government.	-	-	-	-	-	1	-	-	-	-	-	-	-	-
CO5	Extend the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.	-	-	-	-	-	1	-	-	-	-	-	-	-	-
III SEM															

		CO Statements	POs												PSOs	
Course Code		201CS3T01 - ADAVNCED DATA STRUCTURES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		Demonstrate the External Sorting and Hashing.	3	2	-	1	2	-	-	-	-	-	-	-	2	-
CO2		Illustrate the concepts of Priority Queues.	2	2	-	2	3	-	-	-	-	-	-	-	2	-
CO3		Analyze the Efficient Binary Search trees and Multiway Search Trees	3	1	-	1	2	-	-	-	-	-	-	-	2	-
CO4		Compare the Digital Search Structures	3	2	-	2	2	-	-	-	-	-	-	-	2	-
CO5		Apply the String Matching Algorithms to real time applications.	2	1	-	2	3	-	-	-	-	-	-	-	2	-
Course Code		201CS3T02 - OBJECT ORIENTED PROGRAMMING THROUGH C++	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		Compare and Contrast object oriented programming and procedural oriented programming	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2		Summarize the OOPS concepts	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO3		Make use of constructor and destructor to initialize and destroy class objects	3	1	1	-	-	-	-	-	-	-	-	-	2	-
CO4		Apply C++ features such as composition of objects, this pointer, operator overloading, exception handling , compile time and runtime polymorphism	3	2	2	-	-	-	-	-	-	-	-	-	2	-
CO5		Apply inheritance to build real time application	3	2	1	1	-	-	-	-	-	-	-	-	2	-
CO6		Design C++ classes with templates and STL	3	3	3	-	-	-	-	-	-	-	-	-	2	-
Course Code		201CS3T03 - OPERATING SYSTEMS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		Illustrate the basic structure, services, system calls and architectural components of Operating Systems.	3	2	1	-	-	-	-	-	-	-	-	-	2	-
CO2		Analyze various Process Scheduling algorithms and Multi threading models.	2	3	2	1	-	-	-	-	-	-	-	-	3	-
CO3		Demonstrate Inter Process Communication between the processes and deadlocks.	1	2	3	1	-	-	-	-	-	-	-	-	2	-
CO4		Make use of paging, segmentation and virtual memory strategies to allocate memory for the process.	1	1	1	3	-	-	-	-	-	-	-	-	2	-
CO5		Describe the concepts of file system implementation, disk management, Protection and security for system.	1	1	3	1	-	-	-	-	-	-	-	-	2	-
Course Code		201CS3T04 - SOFTWARE ENGINEERING	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		Explain the key facts, concepts, principles, and theories of software & Software Engineering.	3	2	2	-	-	-	-	-	-	-	2	-	2	-
CO2		Compare various software development process models with respective to advantages, disadvantages and applicability	2	3	2	-	-	-	-	-	-	-	2	-	-	-
CO3		Describe the various responsibilities and activities of Software Project Management.	2	2	2	-	-	-	-	-	-	-	3	-	2	-

	CO Statements	POs												PSOs	
CO4	Prepare SRS Document for any real time scenario.	2	3	3	-	-	-	-	-	-	-	2	-	2	-
CO5	Apply various Designs, Coding and testing Principles for developing the software products.	2	2	3	-	-	-	-	-	-	-	2	-	2	-
Course Code	201BS3T13 - DISCRETE MATHEMATICS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Apply the principles of mathematical logic to statement calculus and predicate calculus.	3	2	-	-	-	-	-	-	-	-	-	-	2	-
CO2	Compute Transitive closure, equivalence classes of binary relations.	3	2	-	-	-	-	-	-	-	-	-	-	2	-
CO3	Solve recurrence relations by various methods.	3	2	-	-	-	-	-	-	-	-	-	-	2	-
CO4	Apply the concepts of graph theory to find Euler paths, Hamiltonian paths.	3	2	-	-	-	-	-	-	-	-	-	-	2	-
CO5	Apply the concepts of graph theory to trees.	3	2	-	-	-	-	-	-	-	-	-	-	2	-
Course Code	201CS3L01 - OBJECT ORIENTED PROGRAMMING THROUGH C++	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Use Control Structures and modular programming in solving complex problems.	2	2	2	-	-	-	-	-	3	2	-	-	2	-
CO2	Apply object oriented techniques to solve computing problems	-	2	3	-	-	-	-	-	2	2	-	-	3	-
CO3	Develop C++ classes for code reuse through inheritance	-	2	2	-	-	-	-	-	2	2	-	-	3	-
CO4	Apply exception handling technique to handle various errors	-	2	3	-	-	-	-	-	2	2	-	-	3	-
CO5	Develop C++ programs using Inline, friend functions, Reference variable, this pointer, operator Overloading, static and dynamic binding, template and STL	-	2	2	-	-	-	-	-	-	-	-	-	3	-
Course Code	201CS3L02 - OPERATING SYSTEMS LAB	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Illustrate various process scheduling algorithms	-	2	2	-	-	-	-	-	3	2	-	-	2	-
CO2	Experiment with various system calls and deadlock algorithm	-	2	3	-	-	-	-	-	2	2	-	-	3	-
CO3	Develop algorithms for memory management	-	3	2	-	-	-	-	-	2	2	-	-	2	-
CO4	Explain Page replacement algorithms and file allocation strategies.	-	2	3	-	-	-	-	-	2	2	-	-	2	-
CO5	Make use of Pthread library for thread concurrent execution.	-	2	2	-	-	-	-	-	2	3	-	-	2	-
Course Code	201CS3L03 - UNIX AND SHELL PROGRAMMING	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Make use of Unix utilities and perform basic shell control operations on the Unix utilities.	2	2	-	-	3	-	-	-	-	-	-	-	2	-
CO2	Make use of various commands in UNIX to control various resources like file, network, disk etc.	2	2	-	-	3	-	-	-	-	-	-	-	2	-
CO3	Develop Shell Script using Shell commands.	3	2	-	-	2	-	-	-	-	-	-	2	2	-
CO4	Construct AWK Script using AWK commands.	2	2	-	-	2	-	-	-	-	-	-	2	2	-
CO5	Apply system calls for File Management, Process Management and IPC	2	2	-	-	2	-	-	-	-	-	-	-	2	-

	CO Statements	POs												PSOs	
Course Code	**201SC3L05 - SKILL ORIENTED COURSE- I APPLICATIONS OF PYTHON-NUMPY**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain how data is collected, managed and stored for processing	-	3	-	2	2	-	-	-	-	-	-	1	-	2
CO2	Analyze the workings of various numerical techniques, different descriptive measures of Statistics, correlation and regression to solve the engineering problems.	-	2	-	2	3	-	-	-	-	-	-	2	-	2
CO3	Apply some linear algebra operations to n-dimensional arrays.	-	2	-	3	3	-	-	-	-	-	-	2	-	2
CO4	Develop common data wrangling tasks using Jumpy in Python.	-	2	-	2	3	-	-	-	-	-	-	2	-	2
CO5	Develop common data computational tasks in Python	-	2	-	3	2	-	-	-	-	-	-	2	-	2
Course Code	**201SC3L06 - SKILL ORIENTED COURSE- I WEB APPLICATION DEVELOPMENT USING FULL STACK FRONTEND DEVELOPMENT**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Make use of HTML tags, elements and their attributes for designing static web pages.	-	2	2	-	1	-	-	-	-	-	-	1	2	-
CO2	Experiment with tables to align data and hyperlinks for interactive web pages.	-	2	3	-	2	-	-	-	-	-	-	1	2	-
CO3	Apply form elements for developing Registration and Login WebPages.	-	2	2	-	2	-	-	-	-	-	-	1	2	-
CO4	Build a web page by applying appropriate CSS styles to HTML elements.	-	3	3	-	2	-	-	-	-	-	-	1	2	-
CO5	Develop any real time web site using the core concepts of HTML5 and CSS3 along with media.	-	3	3	-	2	-	-	-	-	-	-	1	2	-
Course Code	**201MC3T03 - BIOLOGY FOR ENGINEERS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Apply biological engineering principles, procedures needed to solve real- world problems.	1	-	-	-	-	-	-	-	-	-	-	-	0	0
CO2	Demonstrate the fundamentals of living things, their classification, cell structure and biochemical constituents.	0	-	-	-	-	-	-	-	-	-	-	-	0	0
CO3	Apply the concept of plant, animal and microbial systems and growth in real life Situations.	1	-	-	-	-	-	-	-	-	-	-	-	0	0
CO4	Explain genetics and the immune system to know the cause, symptoms, diagnosis and treatment of common diseases.	1	-	-	-	-	-	-	-	-	-	-	-	0	0
CO5	Demonstrate basic knowledge of the applications of biological systems in relevant industries.	1	-	-	-	-	-	-	-	-	-	-	-	-	-
IV SEM														
Course Code	**201BS4T16 - PROBABILITY AND STATISTICS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Compute mean, median, mode, standard deviation and variance.	3	2	-	-	-	-	-	-	-	-	-	-	1	-
CO2	Apply various Probability distributions for both discrete and continuous random variables.	3	2	-	-	-	-	-	-	-	-	-	-	1	-

		CO Statements						POs								PSOs	
CO3		Compute mean and variance of sample means with replacement and without replacement and estimating maximum errors.	3	2	-	-	-	-	-	-	-	-	-	-	1	-
CO4		Apply various tests to test the hypothesis concerning mean, Proportion, variance.	3	2	-	-	-	-	-	-	-	-	-	-	1	-
CO5		Apply the concepts of correlation and regression to the given statistical data.	3	2	-	-	-	-	-	-	-	-	-	-	1	-
Course Code	201CS4T05 - FORMAL LANGUAGES AND AUTOMATA THEORY		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Explain the basic concepts of automaton and its properties.		3	1	-	1	-	-	-	-	-	-	-	-	2	-
CO2	Apply inter conversion of regular expression and finite automata.		1	3	1	2	-	-	-	-	-	-	-	-	3	-
CO3	Design grammars to produce strings from a specific language.		2	2	3	2	-	-	-	-	-	-	-	-	2	-
CO4	Construct automaton for a given problem.		1	2	2	3	-	-	-	-	-	-	-	-	2	-
CO5	Analyze decidability and undesirability problems.		2	3	1	2	-	-	-	-	-	-	-	-	1	-
	201CS4T06 - DATABASE MANAGEMENT SYSTEMS		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Summarize the database characteristics and identify various database architectures.		3	-	1	-	1	-	-	-	-	-	-	-	2	-
CO2	Interpret relational database using SQL		1	-	1	-	3	-	-	-	-	-	-	-	1	-
CO3	Examine issues in data storage and query processing for appropriate solutions.		1	2	1	-	3	-	-	-	-	-	-	-	3	-
CO4	Make use of normalization techniques for database design		2	2	1	-	3	-	-	-	-	-	-	-	1	-
CO5	Illustrate the mechanisms of transaction management.		2	3	-	-	1	-	-	-	-	-	-	-	2	-
Course Code	201CS4T07 - JAVA PROGRAMMING		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Apply object oriented programming features and concepts for solving given problem.		3	2	2	-	-	-	-	-	-	-	-	-	1	-
CO2	Solve real time problems using the concepts of class, inheritance, interface and packages		2	2	3	-	1	-	-	-	-	-	-	-	2	-
CO3	Test for runtime exceptions arise in java applications.		2	2	3	-	3	-	-	-	-	-	-	-	2	-
CO4	Develop real time applications using multithreading		2	1	1	-	3	-	-	-	-	-	-	-	2	-
CO5	Build java applications that interact with database for performing data related operations.		2	3	2	-	2	-	-	-	-	-	-	-	2	-
Course Code	201HS4T03 - MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Explain the Managerial Economic concepts for decision making and forward planning		-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Illustrate the law of demand and its exceptions by using different forecasting methods		-	-	-	-	-	-	-	-	-	3	-	-	-	1
CO3	Identify the cost behavior for managerial decision making and Break Even Point (BEP) of an enterprise		1	-	-	-	-	-	-	-	-	-	3	-	-	1
CO4	Classify the different types of business organizations along with basic knowledge on business cycle.		-	-	-	-	-	-	-	-	-	-	-	-	-	1

	CO Statements	POs												PSOs	
CO5	Make use of the process & principles of accounting for the preparation of final accounts.	1	-	-	-	-	-	-	-	-	3	-	-	-	-
CO6	Utilize various techniques on investment project proposals with the help of capital budgeting techniques for decision making.	1	-	-	-	-	-	-	-	-	-	3	-	-	1

Course Code	201CS4L04 - DATABASE MANAGEMENT SYSTEMS LAB	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Make use of the concepts of relational model techniques for database design	-	2	1	3	2	-	-	-	-	-	-	-	2	-
CO2	Construct a database schema for a given problem-domain	-	2	3	1	2	-	-	-	-	-	-	-	1	-
CO3	Apply Normalization techniques on a database to avoid anomalies.	-	3	2	2	3	-	-	-	-	-	-	-	3	-
CO4	Build queries on a database using SQL DDL/DML commands.	-	2	2	1	3	-	-	-	-	-	-	-	2	-
CO5	Develop PL/SQL stored procedures, stored functions, cursors and packages.	-	3	1	1	1	-	-	-	-	-	-	-	1	-

	201CS4L05 - JAVA PROGRAMMING LAB	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Make use of class, inheritance, interface and packages to develop solutions for complex problems.	1	1	3	-	2	-	-	-	-	-	-	-	2	-
CO2	Develop error-handling techniques using exception handling.	2	3	1	-	2	-	-	-	-	-	-	-	2	-
CO3	Build java applications using Threads.	2	1	1	-	2	-	-	-	-	-	-	-	2	-
CO4	Apply event handling to create interactive applications.	2	1	3	-	2	-	-	-	-	-	-	-	2	-
CO5	Build applications using JDBC connectivity	2	1	3	-	2	-	-	-	-	-	-	-	2	-

	201CS4L06 - R PROGRAMMING LAB	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Make use of online resources for R and import new function packages into the R workspace.	3	2	1	1	-	-	-	-	-	-	-	-	2	-
CO2	Import, review, manipulate and summarize data-sets in R.	3	2	1	1	-	-	-	-	-	-	-	-	2	-
CO3	Explore data-sets to create testable hypotheses and identify appropriate	3	2	1	2	-	-	-	-	-	-	-	-	2	-
CO4	Apply appropriate statistical tests using R.	3	2	1	1	-	-	-	-	-	-	-	-	2	-
CO5	Design and edit visualizations with R.	-	-	-	-	-	-	-	-	-	-	-	-	2	-

Course Code	201SC4L18 - SKILL ORIENTED COURSE- II APPLICATIONS OF PYTHON-PANDAS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Use Pandas to create and manipulate data structures like Series and Data Frames.	-	3	-	2	2	-	-	-	-	-	-	1	-	2
CO2	Experiment with arrays, queries, and data frames	-	2	-	2	3	-	-	-	-	-	-	2	-	2
CO3	Apply data frame structures for cleaning and processing and manipulating files	-	2	-	3	3	-	-	-	-	-	-	2	-	2
CO4	Apply data frame structures for manipulating files.	-	2	-	2	3	-	-	-	-	-	-	2	-	2
CO5	Develop basic charts to display data from data frames.	-	2	-	3	2	-	-	-	-	-	-	2	-	-

	CO Statements	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Course Code	**201SC4L19 - SKILL ORIENTED COURSE- II** **WEB APPLICATION DEVELOPMENT USING FULL STACK FRONTEND DEVELOPMENT**														
CO1	Build a web page by embedding JavaScript to invoke programming ability.	-	2	2	-	2	-	-	-	-	-	-	2	2	-
CO2	Make use of Pre-defined JavaScript objects properties and methods	-	2	2	-	2	-	-	-	-	-	-	2	2	-
CO3	Experiment with JavaScript to develop dynamic web pages and validate forms.	-	3	3	-	3	-	-	-	-	-	-	2	2	-
CO4	Choose the appropriate properties and methods to design custom objects.	-	3	3	-	3	-	-	-	-	-	-	2	2	-
CO5	Develop applications using the event handling in JavaScript.	-	3	3	-	3	-	-	-	-	-	-	2	2	-
Course Code	**201MC4T04 - ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE**														
CO1	Identify the concept of Traditional knowledge and its importance.	-	-	-	-	-	1	1	-	-	-	-	-	0	0
CO2	Explain the need and importance of protecting traditional knowledge.	-	-	-	-	-	1	1	-	-	-	-	-	0	0
CO3	Illustrate the various enactments related to the protection of traditional knowledge	-	-	-	-	-	1	1	-	-	-	-	-	0	0
CO4	Interpret the concepts of Intellectual property to protect the traditional knowledge.	-	-	-	-	-	1	1	-	-	-	-	-	0	0
CO5	Explain the importance of Traditional knowledge in Agriculture and Medicine.	-	-	-	-	-	1	1	-	-	-	-	-	-	-
Course Code	**201CS4H01 - SOFT COMPUTING TECHNIQUES** **(HONORS PROGRAM)**														
CO1	Identify the difference between Conventional Artificial Intelligence to Computational Intelligence.	3	2	-	-	-	-	-	-	-	-	-	-	2	-
CO2	Apply fuzzy logic and reasoning to handle and solve engineering problems	2	3	2	2	-	-	-	-	-	-	-	-	3	-
CO3	Describe the advanced neural networks and its applications	2	1	-	-	-	-	-	-	-	-	-	-	2	-
CO4	Perform various operations of genetic algorithms, Rough Sets.	2	2	2	3	-	-	-	-	-	-	-	-	2	-
CO5	Comprehend various techniques to build model for various applications	2	1	2	3	-	-	-	-	-	-	-	-	2	-
Course Code	**201CS4H02 - INTERNET OF THINGS** **(Honors Program)**														
CO1	Explain in a concise manner how the general Internet as well as Internet of Things work.	2	3	1	-	-	-	-	-	-	-	-	-	2	-
CO2	Understand constraints and opportunities of wireless and mobile networks for Internet of Things.	2	3	1	2	-	-	-	-	-	-	-	-	2	-

		CO Statements	POs												PSOs	
CO3		Use basic sensing and measurement and tools to determine the real-time performance of network of devices.	2	3	-	2	-	-	-	-	-	-	-	-	1	-
CO4		Develop prototype models for various applications using IoT technology	2	3	1	2	-	-	-	-	-	-	-	-	1	-
CO5		Explain in a concise manner how the general Internet as well as Internet of Things work	2	3	1	-	-	-	-	-	-	-	-	-	2	-
Course Code	**201CS4H02 - INTERNET OF THINGS (HONORS PROGRAM)**		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Illustrate time and space complexities of an algorithm.		-	3	2	2	-	-	-	-	-	-	1	2	-
CO2	Apply various searching and sorting techniques to solve computing problems.		-	2	2	3	-	-	-	-	-	-	1	3	-
CO3	Make use of linear data structures to solve real time problems.		-	3	2	2	-	-	-	-	-	-	1	3	-
CO4	Develop applications using Tree Data Structures.		-	2	2	3	-	-	-	-	-	-	1	3	-
CO5	Solve problems using Graph Algorithms.		-	3	2	2	-	-	-	-	-	-	1	3	-
Course Code	**201CS4M02 - PRINCIPLES OF SOFTWARE ENGINEERING (Minor Program)**		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the key facts, concepts, principles, and theories of software & Software Engineering		3	2	2	-	-	-	-	-	-	-	2	-	2	-
CO2	Compare various software development process models with respective to advantages, disadvantages and applicability.		2	3	2	-	-	-	-	-	-	-	2	-	-	-
CO3	Describe the various responsibilities and activities of Software Project Management.		2	2	2	-	-	-	-	-	-	-	3	-	2	-
CO5	Apply various Designs, Coding and testing Principles for developing the software products.		2	2	3	-	-	-	-	-	-	-	2	-	2	-
Course Code	**201CS4M01 - DATA STRUCTURES USING C (MINOR PROGRAM)**		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Describe the basic structure of a computer system, various number systems and arithmetic operations.		2	-	-	1	-	-	-	-	-	-	-	-	-	-
CO2	Explain the Operation of CPUs including RTL, ALU, Instruction Cycle and Buses		2	1	1	2	-	-	-	-	-	-	-	-	-	-
CO3	Demonstrate the architecture and functionality of central processing unit		2	2	2	2	-	-	-	-	-	-	-	-	-	-
CO4	Illustrate the I/O and memory organization in an efficient way.		2	1	2	2	-	-	-	-	-	-	-	-	-	-
CO5	Make use of multi processors and pipelining to improve the efficiency of computer system.		2	3	2	2	-	-	-	-	-	-	-	-	-	-