

## **Bachelor of Technology (Computer Science and Business Systems)**

### **Program Outcomes (POs)**

A graduate of the Engineering program will demonstrate

**PO1- Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2- Problem Analysis:** Identify, formulate, review research literature, and analyse 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- Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO9- Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**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 (PSO)**

A graduate of the Computer Science and Business Systems program will demonstrate:

**PSO1:**Analyze, design and develop solution in the areas of Business process management to build the quality products for industry and scope needs .

**PSO2:**Innovate ideas and solutions for real time problems in the field of software developing applications by adapting emerging technologies and tools

## B.Tech Programme in Computer Science and Business Systems

### Course Outcomes (COs)

2022 – 2025 Batch

Sem	Course Code	Course Name	Course Outcomes (COs)
I	22CSBS215	DISCRETE MATHEMATICS	CO1 Employ the concepts of logic for the validity of a program and to arrive at inferences on logical structures. CO2 Use the counting principles in implementing various programs. CO3 Discuss a class of functions which transform a finite set into another finite set which relates to input and output CO4 Illustrate the concepts and properties of algebraic structures such as semi groups, monoids and groups. CO5 Articulate the concepts of Boolean algebra in analyzing logic gates CO6 Employ graphs for Mathematical structures and Solve network analysis problems using graph theory
I	22CSBSPH03	FUNDAMENTALS OF PHYSICS	CO 1 Apply the mathematical model of oscillations to various physical systems. CO 2 Understand the various phenomena involving waves and their applications CO 3 Understand the advanced concepts of quantum mechanics in computational sciences CO 4 Use the concepts of laser and fiber optics in communication. CO 5 Apply the concepts of thermodynamics and electromagnetism for various systems.
I	22CSBS118	PRINCIPLES OF ELECTRICAL ENGINEERING	CO1 Analyse DC and AC circuits and apply circuit theorems. CO2 Realize series and parallel resonant circuits. CO3 Evaluate power in three phase AC circuits. CO4 Understand the principles of electrostatics and electromechanical energy conversion devices. CO5 Experimentally analyse the electric circuits and transducers.

I	22CSBS102	BUSINESS COMMUNICATION & VALUE SCIENCE – I	<p>CO1 Recognize the need for Human values</p> <p>CO2 Recognize own strengths and opportunities</p> <p>CO3 Apply the life skills to different situations</p> <p>CO4 Understand the basic tenets of communication</p> <p>CO5 Apply the basic communication practices in different types of communication</p> <p>CO6 Recognize the need for life skills and values</p>
I	22CSBS112	INTRODUCTORY TOPICS IN STATISTICS, PROBABILITY AND CALCULUS	<p>CO1 Use the concept of differentiation to solve maxima and minima problems.</p> <p>CO2 Solve problems involving integration using different methods.</p> <p>CO3 Predict the data collected by graphical and moment representation to understand the structure of the data.</p> <p>CO4 Solve problems involving conditional Probability and moments.</p> <p>CO5 Demonstrate probability theory to solve application problems</p> <p>CO6 Employ various distributions that arise in data analysis.</p>
I	22CSBS109	FUNDAMENTALS OF COMPUTER SCIENCE	<p>CO1 Define the fundamentals of C programming Language.(L1)</p> <p>CO2 Understand the appropriate Control structures to solve problems.(L2)</p> <p>CO3 Apply the concept of Arrays, Strings and User defined functions(L3)</p> <p>CO4 Demonstrate pointers with arrays and functions(L3)</p> <p>CO5 Experiment the structure and File operations(L4)</p>
II	22CSBS236	LINEAR ALGEBRA	<p>CO1 Describe the concepts of Matrix Algebra and vector spaces</p> <p>CO2 Use matrix algebra techniques to solve system of linear equations.</p> <p>CO3 Solve system of equations using the concept of matrix decomposition.</p> <p>CO4 Illustrate vector spaces in generating ortho-normal bases.</p> <p>CO5 Solve problems of linear transformation using eigen values and eigen vectors.</p> <p>CO6 Use principal component analysis for applications in image processing and machine learning.</p>

II	22CSBS110	FUNDAMENTALS OF ECONOMICS	<p>CO1 Become familiar with both principles of micro and macroeconomics.</p> <p>CO2 Understand about approaches to consumer behaviour and relation between production and cost function.</p> <p>CO3 Describe and discuss on interaction of product and factor market.</p> <p>CO4 Get awareness about importance and development of Indian economy and economic reforms.</p> <p>CO5 Have thorough knowledge in the areas of inflation, unemployment, monetary policy, fiscal policy and international trade.</p>
II	22CSBS119	PRINCIPLES OF ELECTRONICS	<p>CO1 Demonstrate the characteristics of the Semiconductors.</p> <p>CO2 Demonstrate the characteristics of the diode.</p> <p>CO3 Analyse the BJT terminal characteristics and its utilization.</p> <p>CO4 Develop a high degree of familiarity with the FET and MOSFET.</p> <p>CO5 Design suitable amplifiers for any specific applications.</p> <p>CO6 Construct simple digital logic circuits.</p>
II	22CSBS106	DATA STRUCTURES AND ALGORITHMS	<p>CO1 Analyse the various data structure concepts.</p> <p>CO2 Apply the different linear data structures to problem solutions.</p> <p>CO3 Apply the different non-linear data structures to problem solutions.</p> <p>CO4 Critically analyse the various sorting algorithms.</p> <p>CO5 Exemplify the concept of files and its operations.</p>
II	22CSBS202	BUSINESS COMMUNICATION & VALUE SCIENCE – II	<p>CO1 Understand and use tools of structured written communication</p> <p>CO2 Develop materials to create an identity for an organization dedicated to a social cause</p> <p>CO3 Identify individual personality types and role in a team.</p> <p>CO4 Understand the basic concepts of Morality</p> <p>CO5 Understand the basic concepts of Diversity</p> <p>CO6 Organize an event to generate awareness and get support for a cause</p>

II	22CSBS236	STATISTICAL METHODS	<p>CO1 Use the concept of sampling distribution and estimation theory in forecasting.</p> <p>CO2 Employ the concept of correlation, regression using R programming and design experiments.</p> <p>CO3 Illustrate Testing of Hypothesis for industrial problems.</p> <p>CO4 Demonstrate Non-Parametric Testing for Non-Normal Populations.</p> <p>CO5 Examine time series data for its trend and prediction of real-life situation.</p> <p>CO6 Test for ANNOVA of the regression models developed for the real time data</p>
II	22CSBS121	ENVIROMENTAL SCIENCES	<p>CO1 Realize the importance of ecosystems.</p> <p>CO2 Preserve the values of biodiversity.</p> <p>CO3 Be conversant to utilize resources in a sustainable manner.</p> <p>CO4 Find ways to protect the environment and play proactive roles.</p> <p>CO5 Develop and improve the standard of better living</p>
III	22CSBS219	FORMAL LANGUAGE AND AUTOMATA THEORY	<p>CO1 Understand the basics of the languages and grammars, fundamental foundations of theoretical science.</p> <p>CO2 Design finite state machines, pushdown automata, linear bounded automata and Turing machine to solve problems in computing.</p> <p>CO3 Construct regular expressions, context free grammars, context sensitive grammars for various languages.</p> <p>CO4 Determine the decidability and intractability of computational problems.</p> <p>CO5 Classify problems into class P, NP and NP complete.</p>
III	22CSBS105	COMPUTER ORGANIZATION & ARCHITECTURE	<p>CO 1 Use Boolean logic to understand the basic system architecture and instruction sets.</p> <p>CO 2 Apply fixed and floating-point arithmetic operations.</p> <p>CO 3 Gain knowledge on simple CPU design, pipelining and hazards.</p> <p>CO 4 Understand the input/output systems and interfaces.</p> <p>CO 5 Acquire knowledge on memory system design organization.</p>

III	22CSBS228	OBJECT ORIENTED PROGRAMMING	<p>CO1 Define merits of C++ with C</p> <p>CO2 Understand the basic concepts of OOPs, visibility modes and constructors</p> <p>CO3 Apply the object oriented concepts such as encapsulation, inheritance and polymorphism for problem solving</p> <p>CO4 Demonstrate generic Programming and File I/O.</p> <p>CO5 Illustrate Object Oriented Design and Modeling.</p>
III	22CSBS207	COMPUTATIONAL STATISTICS	<p>CO1 Analyze means and variances of the individual variables in a multivariate set and also the correlations between those variables.</p> <p>CO2 To find discriminants, rules to optimally assign new objects to the labelled classes.</p> <p>CO3 Apply the principal component techniques to reduce data and to interpret.</p> <p>CO4 To reduce the number of variables in regression models using Factor analysis</p> <p>CO5 Apply the techniques of clustering methods for massive amounts of data.</p>
III	22CSBS120	SOFTWARE ENGINEERING	<p>CO1 Work in software projects.</p> <p>CO2 Identify the key activities in managing a software project.</p> <p>CO3 Know the various quality models and reliability in software.</p> <p>CO4 Make analysis, modelling and coding for software projects.</p> <p>CO5 Perform the various testing methods for software projects</p>
IV	22CSBS117	OPERATING SYSTEMS	<p>CO1 Grasp the basic concepts of an operating system</p> <p>CO2 Thoroughly analyze the various scheduling algorithms</p> <p>CO3 Able to do concurrent programming</p> <p>CO4 Compare and contrast the various memory management scheme</p> <p>CO5 Evaluate various disk scheduling algorithms</p>

IV	22CSBS213	Design and Analysis of Algorithms	<p>CO1 Analyse the time and space complexity of various algorithms and compare algorithms with respect to complexities.</p> <p>CO2 Ability to decide and Apply Brute Force and Divide and Conquer design strategies to Synthesize algorithms for appropriate computing problems.</p> <p>CO3 Ability to decide and Apply Greedy and Dynamic Programming techniques to Synthesize algorithms for appropriate computing problems.</p> <p>CO4 Ability to decide and Apply Backtracking and Branch and Bound techniques to Synthesize algorithms for appropriate computing problems.</p> <p>CO5 Ability to identify an algorithm is tractable or intractable.</p>
IV	22CSBS214	DESIGN THINKING	<p>CO1 Understand the phases of design thinking process.</p> <p>CO2 Conduct an immersion activity to create an empathy map.</p> <p>CO3 Define the key problems of the personas created.</p> <p>CO4 Apply the ideation phase steps to present the prototype ideas.</p> <p>CO5 Create a prototype with value propositions and test the prototype.</p>



IV	22CSBS229	OPERATION RESEARCH	<p>CO1 Discuss introductory concepts of Operations research, Queuing, PERT and CPM and Inventory models</p> <p>CO2 Examine sensitivity of the optimized solution of Linear Programming Problems (LPP) in conjunction with R programming.</p> <p>CO3 Use MODI and Hungarian methods to solve transportation and assignment problems for optimal solutions integrating R programming.</p> <p>CO4 Solve queueing and servicing related problems using queuing theory and simulation techniques integrating R programming.</p> <p>CO5 Employ PERT &amp; CPM techniques for optimizing project completion time in conjunction with R programming.</p> <p>CO6 Inspect the sensitivity of the known or unknown stock situations in inventory models using analytical and simulation techniques integrating R programming.</p>
IV	22CSBS107	DATATBASE MANAGEMENT SYSTEMS	<p>CO 1 Describe the data models and DBMS architecture.</p> <p>CO 2 Demonstrate SQL Programming language and normalization theory.</p> <p>CO 3 Make use of the query evaluation techniques, query optimization and familiar</p> <p>CO 4 Understanding the basic issues of transaction processing and concurrency control with basic database storage Structures and access techniques.</p> <p>CO 5 Develop information model expressed in the form of an entity relation diagram and transform into a relational database schema</p>

IV	22CSBS223	MARKETING RESEARCH AND MARKETING MANAGEMENT	CO1 Understand the basic marketing concepts. CO2 Comprehend the dynamics of marketing and analyze how various components interact with each other in the real world. CO3 Leverage marketing concepts for effective decision making. CO4 Understand the basic concepts and the application of statistical tools in marketing research. CO5 Understand internet marketing, Business to Business marketing, Promotion in business markets, CRM and Strategies adopted in B2B markets.
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