

COURSE OUTCOMES

**DEPARTMENT OF COMPUTER SCIENCE &
ENGINEERING**



COLLEGE OF ENGINEERING ROORKEE
ACADEMIC YEAR – 2020-21

Preface

This document presents a compilation of the Course Outcomes (COs) for all subjects taught in a program leading to degree in **B. Tech (Computer Science & Engineering)**. The COs outline a few (about 5) significant learning outcomes that a student is expected to learn while studying the subject. Besides, each Course Outcome is associated with one or more of the 5 Blooms Taxonomy Levels as listed below:

Bloom's Levels	Bloom's Taxonomy
1	Remember and Understand (Referred to as 'Understand' in all Course outcomes)
2	Apply
3	Analyze
4	Evaluate
5	Create

At the College of Engineering Roorkee (COER), the curriculum is prescribed by the affiliating University. Efforts are made to make the teaching learning process Outcome Based Education (OBE) oriented. Outcome-based education offers a powerful managing technical education to be effective in its goals.

The OBE process started at COER systems in 2018 and went through evolution phases. This document presents consolidated Course Outcomes (CO) of the all courses offered in the academic year 2020-21. For this purpose, Course Outcome (CO) committees were formed, which consisted Dean Academics, Head of the Department and a senior faculty members of the respective departments. They defined COs for each course by referring to contents of the respective syllabus. Bloom's Taxonomy levels were also assigned for each identified CO.

Head

Dean Academics

Teaching Scheme: B.Tech. (Computer Science & Engineering)

Semester: 1st

S. No	Subject's Title	Subject Code	L	T	P	Credits
1	Programming for Problem Solving	BCST 101	3	1	0	4
2	Programming for Problem Solving Lab	BCSP 101	0	0	2	1

Semester: 3rd

S. No	Subject's Title	Subject Code	L	T	P	Credits
1	Energy & Environmental Engineering	BCET 301	3	1	0	4
2	Discrete Structure	BCST 302	3	1	0	4
3	Data Structure	BCST 303	3	1	0	4
4	Digital Electronics	BEET 303	3	1	0	4
5	Object Oriented Programming & Methodology	BEET 305	3	1	0	4
6	Computer Workshop (Using Python)	BCSP 306	0	0	2	1
7	Data Structure Lab	BITP 303	0	0	2	1
8	Digital Electronics Lab	BECP 303	0	0	2	1
9	Object Oriented Programming & Methodology Lab	BITP 305	0	0	2	1

Semester: 4th

S. No	Subject's Title	Subject Code	L	T	P	Credits
1	Mathematics-III	BAST 401	3	1	0	4
2	Database Management Systems	BECT 402	3	1	0	4
3	Software Engineering	BECT 403	3	0	2	4
4	Computer Organization & Architecture	BEET 404	3	1	0	4
5	Theory of Automata & Formal Languages	BEET 405	3	1	0	4
6	Universal Human Values - 2	BHUT 401	2	1	0	3
7	Database Management Systems Lab	BECP 402	0	0	2	1
8	Computer Organization & Architecture Lab	BEEP 404	0	0	2	1
9	Software Engineering Lab	BECP 403	0	0	2	1
10	Theory of Automata & Formal Languages Lab	BEEP 405	0	0	2	1

Semester: 5th

S. No	Subject's Title	Subject Code	L	T	P	Credits
1	Operating System	BCST 501	3	1	0	4
2	Computer Networks	BCST 502	3	1	0	4
3	Design & Analysis of Algorithms	BCST 503	3	1	0	4
4	Departmental Elective-I (Java programming)	BCST 504	3	1	0	4
5	Open Elective I (Principles of Programming Languages)	BOCS 505	3	1	0	4
6	Operating System Lab	BCSP 501	0	0	2	1
7	Computer Networks Lab	BCSP 502	0	0	2	1
8	Design & Analysis of Algorithms Lab	BCSP 503	0	0	2	1
9	Virtual lab (Java)	BCST 506	0	0	2	1

Semester: 6th

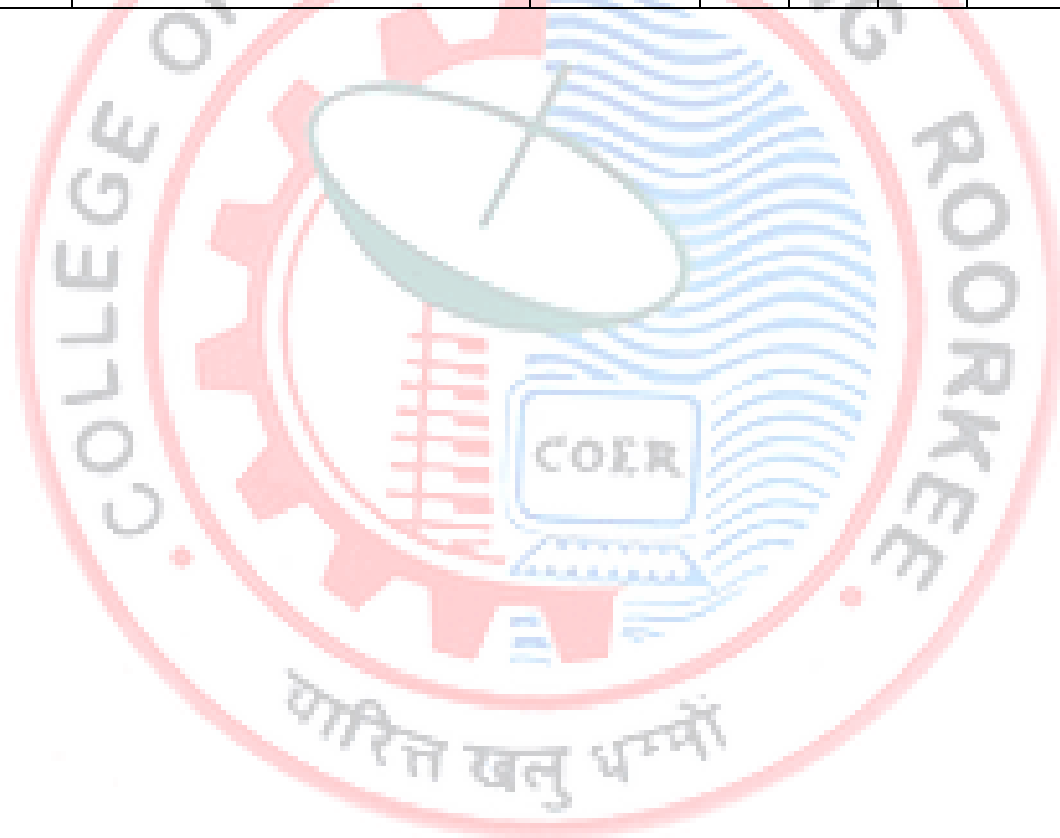
S. No	Subject's Title	Subject Code	L	T	P	Credits
1	Microprocessors & Applications	BCST 601	3	1	0	4
2	Compiler Design	BCST 602	3	1	0	4
3	Data Analytics	BCST 603	3	1	0	4
4	Departmental Elective (Computer Graphics & Visualization)	BCST 604	3	1	0	4
5	Open Elective (Machine Learning)	BOCS 605	3	1	0	4
6	Microprocessors & Applications Lab	BCSP 601	0	0	2	1
7	Compiler Design Lab	BCSP 602	0	0	2	1
8	Data Analytics Lab	BCSP 603	0	0	2	1
9	Open Source Software Lab	BITP 606	0	0	2	1

Semester: 7th

S. No	Subject's Title	Subject Code	L	T	P	Credits
1	System Administration	TCS 701	3	1	0	4
2	Advance Computer Architecture	TCS 702	3	1	0	4
3	Data Warehousing & Mining	TCS 703	3	1	0	4
4	Elective-I (Digital Image Processing)	TCS 071	3	1	0	4
5	Open Elective (EDP)	TOE 05	3	1	0	4
6	System Administration Lab	PCS 751	0	0	2	1
7	Project	PCS 757	0	0	4	2
8	Industrial Interaction	PCS 758	0	0	2	1

Semester: 8th

S. No	Subject's Title	Subject Code	L	T	P	Credits
1	Distributed Computing	TCS 801	3	1	0	4
2	Web Technology	TCS 802	3	1	2	5
3	Elective –II (Parallel Computing)	TCS 081	3	1	0	4
4	Elective –III(Cryptography & Network Security)	TCS 089	3	1	0	4
5	Web Technology Lab	PCS 852	0	0	2	1
6	Project	PCS 857	0	0	6	3



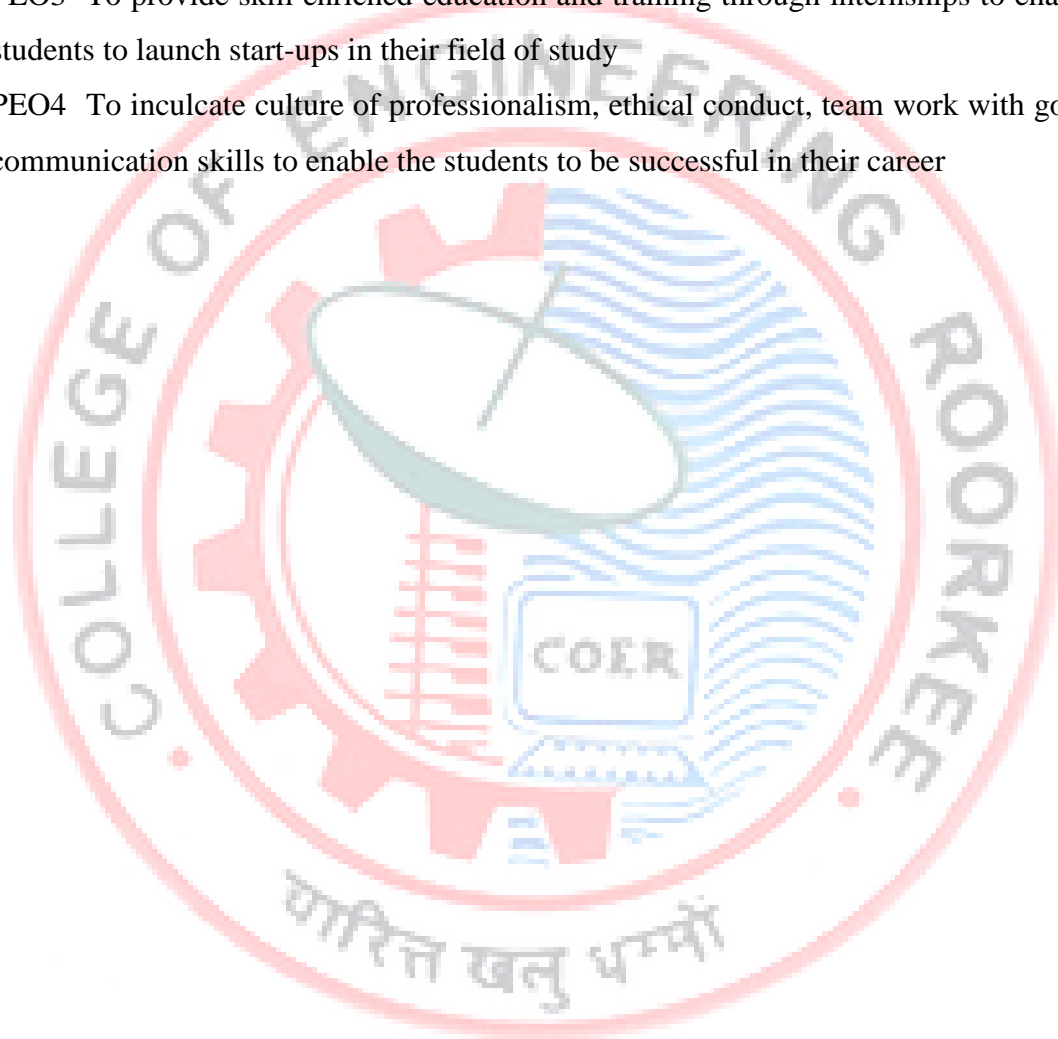
Program Educational Objectives (PEOs)

PEO1 To equip the students with lifelong skills so that they can work and contribute to the infrastructural development projects of the public and private sectors

PEO2 To provide research oriented education with knowledge of state-of-art analytical and experimental tools to enable students to pursue higher studies in institutions of repute in India and abroad

PEO3 To provide skill enriched education and training through internships to enable students to launch start-ups in their field of study

PEO4 To inculcate culture of professionalism, ethical conduct, team work with good communication skills to enable the students to be successful in their career



Program Specific Outcomes (PSOs)

PSO1 The student will have rigorous training in experimental support to the theoretical concepts which will lead to strengthening their research work

PSO2 The students will have knowledge of advanced programming languages and analytical tools for developing solution of given problems

PSO3 The student will have rigorous training in experimental support to the theoretical concepts which will lead to strengthening their research work



Program Outcomes (POs)

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 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 modeling 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.

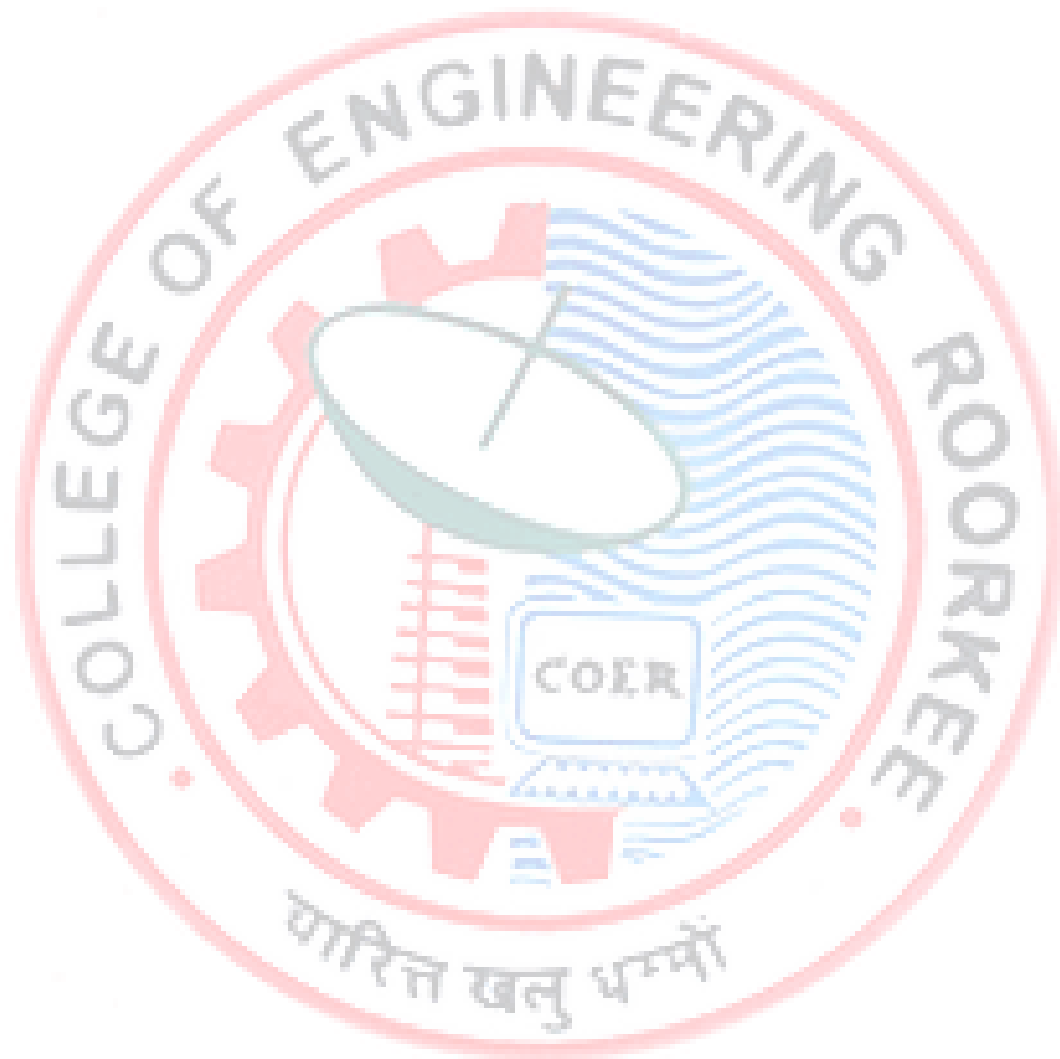
PO9 Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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.



COURSE OUTCOMES (COs)

Name:Programming for Problem Solving

CourseCode:BCST101

YearofStudy:I

Semester:I

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL
CO-1	Formulate simple algorithms for arithmetic and logical problems.	Understand, Create	B.L-1,5
CO-2	Remember the basics of Computer Fundamentals of Computer History	Understand	B.L-1
CO-3	Translate the algorithms to programs (in C language). Also to test and execute the programs and correct syntax and logical errors.	Analyze, Evaluate	B.L-3,4
CO-4	Implement conditional branching, iteration and recursion.	Apply	B.L-2
CO-5	Analyze the problem for its decomposition into functions and synthesize a complete program using divide and conquer approach.	Analyze	B.L-3

Course Name: Energy and Environmental Engineering

Course Code: BCET-301

Year of Study: II

Semester: III

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Understand the energy requirement for day to day life and describe various energy resources.	Remember	B.L.-1
CO-2	Respond to global policy initiatives and meet the emerging challenges with sustainable technological solutions in the field of energy and environment.	Apply	B.L.-2
CO-3	Analyze the life cycle thinking and environmental impacts of the energy generation.	Analyze	B.L.-3
CO-4	Evaluate the efficiency of different energy sources (Fossil & alternative) and inter-relation between development activities & their impact on the environment.	Evaluate	B.L- 4
CO-5	Plan to have a balance between industrial growth and environment by forging alternative energy resources.	Create	B.L.-5

Course Name: Discrete Structure **Course Code:** BCST-302

Year of Study: II

Semester: III

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Understand the basic principles of sets, relations and functions and determine their properties.	Understand	B.L-1
CO-2	Apply deductive logic and prove the solution of a given problem based on logical inference	Apply	B.L-2
CO-3	Analyze and classify a given algebraic structure.	Analyze	B.L-3
CO-4	Evaluate the given problem using deductive logic and prove the solution based on logical inference	Evaluate	B.L-4
CO-5	Design a graph network for the given problem and solve with techniques of graph theory.	Create	B.L-5

Course Name: Data Structure

Course Code: BCST-303

Year of Study: II

Semester: III

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Select appropriate data structures as applied to specified problem definition.	Understand, Create	B.L-1,5
CO-2	Implement operations like searching, insertion and deletion, traversing mechanism etc. on various data structures	Apply	B.L-2
CO-3	Students will be able to implement Linear and Non-Linear data structures such as Trees, Hashing etc.,	Analyze, Apply	B.L-2,3
CO-4	Learn and understand various important concepts of Sorting and Searching	Understand	B.L-1
CO-5	Implement appropriate sorting/searching technique for given problem.	Understand	B.L-1

Course Name: DIGITAL ELECTRONICS **Course Code:** BECT-303

Year of Study: II

Semester: III

The student will be able to:

COs	COURSE OUTCOME	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Represent numerical values in various number systems and perform conversions from one number system to another.	Apply	BL-2
CO-2	Explain operation of logic gates using IEEE/ANSI standard symbols.	Understand	BL-1
CO-3	Perform various minimization techniques in order to reduce the number of gates required to design any logic.	Evaluate	BL-4
CO-4	Analyze digital combinational circuits and sequential logic circuits.	Analyze	BL-3
CO-5	Design digital combinational circuits and sequential logic circuits.	Create	BL-5

Course Name: OOPs **Course Code:** BCST-305

Year of Study: II **Semester:** III

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Explain the ability to apply the knowledge of object oriented concepts for solving system modeling and design problems.	Analyze	B.L-3
CO-2	Specify simple abstract data types and design implementations, using abstraction functions to document them.	Apply	B.L-2
CO-3	Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.	Understand	B.L-1
CO-4	Name and apply some common object-oriented design patterns and give examples of their use.	Apply	B.L-2
CO-5	Design applications with an event-driven graphical user interface.	Create	B.L-5

Course Name: Universal Human Values

Course Code: BHUT 401

Year of Study: 2nd

Semester: 4th

The student will be able to

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO 1	To understand the importance of value inputs for personal and professional lives.	Understand	B.L-1
CO 2	To comprehend the difference between values and skills, happiness and the accumulation of physical assets, the Self and the Body, an individual's Intention and Competence.	comprehend	B.L-1
CO 3	To analyze the importance of harmonious relationships built on trust and respect and develop better understanding of personal and professional lives	Analyze	B.L-3
CO 4	Understand the importance of human beings in maintaining societal and environmental equilibrium.	Apply	B.L-1
CO 5	Evaluate ethical and immoral actions, and begin devising a plan to create a happy workplace atmosphere.	Evaluate	B.L-1

Course Name: Mathematics III

Course Code: BAST-401

Year of Study: II

Semester: IV

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	The concept of Fourier Integral, Fourier transform, Inverse Fourier transform, Laplace transform, Inverse Laplace transform, Numerical and statistical methods /Formulae to evaluate engineering problems.	Understand	B.L-1
CO-2	The Properties of the Fourier transform, Inverse Fourier transform, Laplace transform, Inverse Laplace transform The concept of the roots of algebraic and transcendental equations, interpolation, differentiation, integration, the solution of differential equations(by numerical methods) correlation, regression, moments, skewness, kurtosis and curve fitting.	Understand	B.L-1
CO-3	Solve simple one dimensional heat transfer equations, linear differential equations by using Fourier and Laplace transform respectively.	Apply	B.L-2
CO-4	The convolution theorems, Skewness, Kurtosis, Curve Fitting, Correlation, Rank correlation and Regression Analysis.	Analyze	B.L-3
CO-5	The Fourier and Laplace transform of the functions, roots of algebraic and transcendental equations, polynomials by interpolation methods, differentiation, integration, solution of differential equations(by numerical methods) , correlation, regression, moments, skewness, kurtosis and curve fitting of any tabulated data.	Evaluate	B.L-4

Course Name: DBMS **Course Code:** BCST-402

Year of Study: II

Semester: IV

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	For a given query write relational algebra expressions for that query and optimize the developed expressions	Understand	B.L-2
CO-2	For a given specification of the requirement design the databases using ER method and normalization	Apply	B.L-3
CO-3	For a given specification create the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2.	Create	B.L-6
CO-4	To analyze a given query to optimize its execution using Query optimization algorithms	Analyze	B.L-4
CO-5	For a given evaluation of transaction-processing system, determine the transaction atomicity, consistency, isolation, and durability	Evaluate	B.L-5

Course Name: Software Engineering

Course Code: BCST-403

Year of Study: II

Semester: IV

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Implement software life cycle models and have a knowledge of different phases of software life cycle	Apply	B.L-2
CO-2	Identify, formulate ,review, estimate and schedule complex software projects using principles of mathematics	Understand	B.L-1
CO-3	Create a bug free software with good design and quality by using appropriate techniques and modern engineering I.T tools.	Create	B.L-5
CO-4	Analyze verification validation activities, static ,dynamic testing debugging tools and importance of working in teams	Analyze	B.L-3
CO-5	Classify the requirements and prepare software requirement documents for analyzing the projects	Evaluate	B.L-4

Course Name: Computer Organization and Architecture

Course Code: BCST-404

Year of Study: II

Semester: IV

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Understand the evolution of processors, their present technology and inter-process communication.	Understand	B.L-1
CO-2	Apply and Implement fundamental coding schemes. Draw the functional block diagram of a single bus architecture of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set.	Apply	B.L-2
CO-3	Analyze flowchart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process.	Analyze	B.L-3
CO-4	Evaluate CPU organization and instruction, design a memory module and analyze its operation by interfacing with the CPU.	Evaluate	B.L-4
CO-5	Create the organization for the Control unit, Arithmetic and Logical unit, Memory unit and the I/O unit	Create	B.L-5

Course Name: Theory of Automata & Formal Language

Course Code: BCST-405

Year of Study: II **Semester:** IV

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Explain basic concepts in formal language theory, grammars, automata theory, computability theory, and complexity theory	Understand	B.L-1
CO-2	Demonstrate abstract models of computing, including deterministic (DFA), non-deterministic (NFA), Push Down Automata (PDA) and Turing (TM) machine models and their power to recognize the languages.	Evaluate	B.L-4
CO-3	Relate practical problems to languages, automata, computability, and complexity.	Analyze	B.L-3
CO-4	Students will be able to apply mathematical and formal techniques for solving problems in computer science.	Apply	B.L-2
CO-5	Explain the relationship among language classes and grammars with the help of Chomsky Hierarchy.	Understand	B.L-1

Course Name: Operating System **Course Code:** BCST-501

Year of Study: III **Semester:** V

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Understand the important computer system resources and the role of operating system in their management policies and algorithms, storage management policies and memory management and its allocation policies.	Understand	B.L-1
CO-2	Apply the process management policies and scheduling of processes by CPU.	Apply	B.L-2
CO-3	Analyze a system model for deadlock and methods for handling deadlocks	Analyze	B.L-3
CO-4	Evaluate the requirement for process synchronization and coordination handled by operating system	Evaluate	B.L-4
CO-5	Using the existing algorithms create solutions for real life problems or can even create new algorithms.	Create	B.L-5

Course Name: Computer Network **Course Code:** BCST-502

Year of Study: III **Semester:** V

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Understand basic computer network technology.	Understand	B.L-1
CO-2	Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each Layer.	Apply	B.L-2
CO-3	Identify the different types of network topologies and protocols.	Analyze	B.L-3
CO-4	Evaluate and implement the skills of subnetting and routing mechanisms.	Evaluate	B.L-4
CO-5	Design and implement a peer to peer file sharing application utilizing application layer protocols such as HTTP, DNS, and SMTP and transportation layer protocol.	Create	B.L-5

Course Name: Design & Analysis of Algorithm

Course Code: BCST- 503

Year of Study: III

Semester: V

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Understand the concept of algorithm and how design methods impact the performance of programs.	Understand	B.L-1
CO-2	Apply the appropriate data structure and algorithm design method for a specified application.	Apply	B.L-2
CO-3	Analyze the performance of algorithm using various methods such as Master method, Recurrence Tree method and Substitution method.	Analyze	B.L-3
CO-4	Evaluate problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking and branch & bound.	Evaluate, Analyze	B.L-4, B.L.-3
CO-5	Using the existing algorithms create solutions for real life problems or can even create new algorithms.	Create	B.L-5

Course Name: Java Programming **Course Code:** BCST -504

Year of Study: III

Semester: V

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Understand structure and model of the Java programming language	Understand	B.L-1
CO-2	Analyze and develop exception handling and multithreaded programs	Analyze	B.L-3
CO-3	Design and Develop GUI based applications using AWT & Swing	Create	B.L-5
CO-4	Apply knowledge of JDBC to create programs for establishing database connectivity	Apply	B.L-2
CO-5	Evaluate and Create Network programs	Evaluate, Create	B.L-4, B.L-5

Course Name: PPL

Course Code: BOCS-505(A)

Year of Study: Third

Semester: V

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Develop a greater understanding of different programming methodologies, the issues involved in programming language design and implementation and programming language	Understand	B.L-1
CO-2	Develop an in-depth understanding of functional, logic, and object-oriented programming paradigms	Create	B.L-5
CO-3	Implement several programs in languages other than the one emphasized in the core curriculum (C Language & Other Languages)	Apply	B.L-2
CO-4	Use of functional programming languages like LISP, ML	Analyze	B.L-3
CO-5	Develop a greater understanding of evolution of datatypes, Sequence control type, methodologies, program translation process, design/implementation issues involved with variable allocation and binding	Evaluate	B.L-4

CourseName:MicroprocessorsandApplications
CourseCode: BCST601
YearofStudy:III

Semester:VI

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Assess and solve basic binary math operations using the microprocessor and explain the microprocessor's and Microcontroller's internal architecture and its operation	Understand	B.L.-1
CO-2	Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of	Apply	B.L.-2
CO-3	Analyze assembly language programs; select appropriate assemble into machine across assembler utility of a microprocessor and microcontroller.	Analyze	B.L.-3
CO-4	Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.	Create	B.L.-5
CO-5	Evaluate assembly language programs and download the machine code that will provide solutions real-world control problems.	Evaluate	B.L.-4

Course Name: Compiler Design

Course Code: BCST - 602

Year of Study: III

Semester: VI

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Understand the different representations of intermediate code between various phases of compiler and functionality of each phase involved in the compilation process	Understand	B.L-1
CO-2	Apply different error recovery routines to recover the errors seen at different phases of compilation	Apply	B.L-2
CO-3	Analyze benefits and limitations of automatic memory management	Analyze	B.L-3
CO-4	Evaluate the parsing techniques including Bottom-up and Top-down parsing for the given programming construct described in Context Free Grammar.	Evaluate	B.L-4
CO-5	Student can create their own compiler or can work on a particular phase of compiler	Create	B.L-5

Course Name: Data Analytics

Course Code: BCST-603

Year of Study: 3rd

Semester: 6th

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Understanding the basic concepts of Probability distribution and statistics	Understand	B.L-1
CO-2	Apply the learned data analytics concepts to handle the big data problems	Apply	B.L-2
CO-3	Analyze the Hadoop map reduce and Hadoop file system	Analyze	B.L-3
CO-4	Understand and evaluate the mapping, extraction, transformation and subdividing processes for data preparation in Hadoop map reduce	Evaluate	B.L-1 B.L-4
CO-5	Apply and Create the adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc	Apply, Create	B.L-2 B.L-5

Course Name: Computer Graphics and Visualization

Course Code: BCST-604

Year of Study: III

Semester:VI

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Have a basic understanding of the core concept of computer graphics	Understand	B.L-1
CO-2	Classify and describe various Computer Graphics Tools and Techniques	Apply,	B.L-2
CO-3	Evaluate various Algorithms of 2D and 3D Transformations on different type of objects	EVALUATE	B.L-4
CO-4	Creating a typical graphics Pipeline	Analyze	B.L.3
CO-5	Capable of using OpenGL to create interactive computer graphics.	create	B.L-5

Course Name: Machine Learning **Course Code:** CS-605(B)

Year of Study: 3rd

Semester: 6th

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Understand the basic concepts of regression analysis, supervised and unsupervised machine learning algorithms	Understand	B.L-1
CO-2	Apply the learned concepts of machine learning to interpret the various problems	Apply	B.L-2
CO-3	Analyze the different mathematical machine learning models for various systems	Analyze	B.L-3
CO-4	Evaluate the performance of the machine learning model using measuring parameters	Evaluate	B.L-4
CO-5	Create the efficient machine learning system to solve the various real time problems	Create	B.L-5

Course Name:System Administration

Course Code: TCS-701

Year of Study: IV **Semester:** VII

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Ability to understand the Unix Operating System and the working of the built in commands available in UNIX.	Understand	B.L-2
CO-2	Analyze the duties of the system administration in UNIX environment.	Analyze	B.L-4
CO-3	Understanding and administering file permissions on directories and regular files	Remember	B.L-1
CO-4	Taking appropriate measures to increase system performance	Evaluate	B.L-3
CO-5	Implementing basic security measures including Accounting of resources and basic for Network Services and security measures	Create	B.L-5

Course Name: Advance Computer Architecture

Course Code: TCS-702

Year of Study: IV

Semester: VII

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Understand the classification of computers, new trends and developments in computer architecture and concept of parallelism	Understand	B.L-1
CO-2	Understand different system interconnect architectures and different advanced processor technology	Create	B.L-5
CO-3	Understand pipelining, instruction set architectures, memory addressing.	Apply	B.L-2
CO-4	Analyze the various techniques to enhance a processors ability to exploit Instruction-level parallelism (ILP), and its challenges.	Analyze	B.L-3
CO-5	Understand multicore architecture and its case studies	Evaluate	B.L-4

Course Name: Data warehousing and mining **Course Code:** TCS-703

Year of Study: 4th **Semester:** 7th

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Understand the Association rule mining, supervised and unsupervised learning algorithm in data mining	Understand	B.L-1
CO-2	Apply the different pre-processing techniques to process the data	Apply	B.L-2
CO-3	Analyze the data warehouse architecture and its components	Analyze	B.L-3
CO-4	Evaluate the performance matrices using classification and clustering algorithm over the complex data objects	Evaluate	B.L.-4
CO-5	Create skill in selecting the appropriate data mining algorithm for solving practical problems.	Create	B.L-5

Course Name: Digital Image Processing

Course Code: TCS-071

Year of Study: 4th

Semester: VII

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Review the fundamental concepts of a digital image processing system.	Understand	B.L-1
CO-2	Analyze images in the frequency domain using various transforms.	Analyze	B.L-3
CO-3	Evaluate the techniques for image enhancement and image restoration.	Evaluate	B.L-4
CO-4	understand the need for image compression and to learn the spatial and frequency domain techniques of image compression.	Understand	B.L-1
CO-5	Categorize various compression techniques.	Create	B.L-5

Course Name:ENTREPRENURSHIP DEVELOPMENT

Course Code: TOE-05

Year of Study: IV

Semester: VII

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Develop & understanding of the fundamental concepts of Entrepreneur.	Apply	B.L-2
CO-2	Relate, discuss, understand, and present accounting concepts, cost concepts.	Analyze	B.L-3
CO-3	Knowledge and understanding of various Laws concerning entrepreneur.	Evaluate	B.L-4
CO-4	Understand the project cost and financial report.	Understand	B.L-1
CO-5	Understand how to create Balance Sheet.	Create	B.L-5

Course Name: Distributed Computing

Course Code: TCS-801

Year of Study: Fourth

Semester:VIII

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Study software components of distributed computing systems. Know about the communication and interconnection architecture of multiple computer systems.	Understand	B.L-1
CO-2	Recognize the inherent difficulties that arise due to distributed-ness of computing resources. Understanding of networks & protocols, mobile & wireless computing and their applications to real world problems.	Evaluate	B.L-4
CO-3	At the end students will be able to apply the knowledge to design, implement distributed system	Apply, Create	B.L-2,5
CO-4	Analyze the Cloud computing setup with it's vulnerabilities and applications using different architectures	Analyze	B.L-3
CO-5	Define Cloud Computing and memorize the different Cloud service and deployment models	Understand	B.L-1

Course Name: Web Technology

Course Code: TCS-802

Year of Study: IV

Semester: VIII

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Describe and differentiate different Web Extensions and Web Services.	Understand	B.L-1
CO-2	Apply fundamental computer theory to basic programming techniques and fundamental skills to maintain web server services required to host a website.	Apply	B.L-2
CO-3	Select and apply markup languages for processing, identifying, and presenting of information in web pages.	Analyze	B.L-3
CO-4	Use scripting languages and web services to transfer data and add interactive components to web pages.	Apply	B.L-2
CO-5	Create and manipulate web media objects using editing software.	Create	B.L-5

Course Name: Parallel Computing **Course Code:** TCS-081

Year of Study: IV

Semesters: VIII

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	To understand the basic concepts of parallel computing environments	Understand	B.L-1
CO-2	To apply knowledge of computing and mathematics appropriate to the discipline	Apply	B.L-2
CO-3	To analyze a problem and identify the computing requirements appropriate for its solution	Analyze	B.L-3
CO-4	To evaluate a computer-based system, process, component or program to meet desired needs	Evaluate	B.L.-4
CO-5	To create the shortest path between various parallel nodes in the network	Create	B.L-5

Course Name: Cryptography and Network Security

Course Code: TCS-089

Year of Study: IV

Semester: VIII

The student will be able to:

COs	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO-1	Understand various attacks and need of cryptography	Understand	B.L-1
CO-2	Apply various substitution and transposition ciphers for securing a message.	Apply	B.L-2
CO-3	Analyze the need and functioning of various block ciphers	Analyze	B.L-3
CO-4	Understand and create various public key algorithms for securing the message	Understand, Create	B.L-1, B.L-5
CO-5	Evaluate how to maintain the Confidentiality, Integrity and Availability of a data	Evaluate	B.L-4