

# NETAJI SUBHASH ENGINEERING COLLEGE

## B.TECH IN COMPUTER SCIENCE AND BUSINESS SYSTEMS (CSBS)

ALL COURSE OUTCOMES ARE FURNISHED FOLLOWING THE SYLLABUS

Semester	Course Title (Code)	CO Codes	Course Outcomes (COs)
1	Physics-I (BS-PH101)	BS-PH101.1	To remember the requirements of simple harmonic motion and can differentiate between damped and forced vibration analytically and apply the knowledge in the analysis of operation of various LCR circuits.
		BS-PH101.2	To understand theory of optical interference and diffraction and can apply the knowledge in understanding thin film interference in films of equal thickness and wedge shaped films, can essentially differentiate between two diffraction types and Fraunhofer diffraction through single, double and multiple slits and can also be familiar with functioning of various optical instruments.
		BS-PH101.3	To apply the true nature of light as an electromagnetic wave, can apply the knowledge in understanding working of polarimeter and polaroid of different kinds.
		BS-PH101.4	To analyze the production and principle of working of LASERs at the atomic level. apply the knowledge in designing many modern devices and technologies based on lasers and optical fibres and holography.
		BS-PH101.5	To evaluate the basic concepts and experiments of modern physics and can understand the basic differences between Newtonian mechanics and quantum mechanics, wave-particle duality, Heisenberg's uncertainty principle.
		BS-PH101.6	To create seven types of crystal systems, unit cell properties of different cubic, HCP and diamond structures, identify Miller indices of given crystal planes and draw planes using Miller indices, important orientation of crystal planes in cubic systems and inter-planar spacing and can also gather knowledge about how X-rays are produced in laboratory using Coolidge tube, types of X-rays and application in crystallography.
1	Mathematics-I (BS-M101)	BS-M101.1	To remember Determinants and Matrices; solve system of linear equations and Eigen value/vector problems.
		BS-M101.2	To understand Mean Value theorems, Taylor series for expansion of elementary functions.
		BS-M101.3	To apply Reduction Formulae for some integrals.
		BS-M101.4	To analyze basic understanding of functions of several variables and multiple integrals
		BS-M101.5	To evaluate basic Vector Calculus and simple problems of Divergence and Stoke's Theorem.
		BS-M101.6	To create convergence of infinite series of positive terms/alternating terms.
1	Basic Electrical Engineering (ES-EE101)	ES-EE101.1	To remember and explain electrical components, electrical circuits and DC network theorems.
		ES-EE101.2	To understand the knowledge of series, parallel and electromagnetic circuits.
		ES-EE101.3	To apply appropriate distinguish between conductors, nonconductors and semiconductors based on energy band theory and classify different types of semiconductors.
		ES-EE101.4	To analyze the operating principle and output characteristics of p-n junction diodes, zener diode, Varactor diode, BJT, rectifiers and different diode circuits.
		ES-EE101.5	To evaluate different parameters for characterizing different circuits like rectifiers, regulators etc. using diodes and BJTs.
		ES-EE101.6	To create the concept of Energy Band Theory and Fermi Levels to explain the operating principle of semiconductors.
1	Physics-I Laboratory (BS-PH191)	BS-PH191.1	To remember the concepts of elasticity of materials by finding Young's modulus and other characteristics of a metallic bar and accordingly verifying Hook's Law.
		BS-PH191.2	To understand the concepts of elasticity of materials by finding Rigidity Modulus of a metallic rod and accordingly verifying Hook's Law.
		BS-PH191.3	To apply the theoretical knowledge of interference and division of amplitude by measuring wavelength of light or curvature of lens using Newton's ring experimental set up.
		BS-PH191.4	To analyze the idea of dispersion and minimum deviation of light for prism by finding out dispersive power of the material of a prism.
		BS-PH191.5	To evaluate the knowledge of Wheatstone Bridge Principle by measuring the resistivity of the wire of a meter bridge and by calculating the value of resistance of a unknown sample.
		ES-EE191.1	To remember concepts of electrical components, electrical circuits and DC network theorems.
		ES-EE191.2	To understand series & parallel circuit & the effect of resonance.

Semester	Course Title (Code)	CO Codes	Course Outcomes (COs)
1	Basic Electrical Engineering Laboratory (ES-EE191)	ES-EE191.3	To apply appropriate distinguish between conductors, nonconductors and semiconductors based on energy band theory and classify different types of semiconductors.
		ES-EE191.4	To analyze the operating principle and output characteristics of p-n junction diodes, zener diode, Varactor diode, BJT, rectifiers and different diode circuits.
		ES-EE191.5	To evaluate compute different parameters for characterizing different circuits like rectifiers, regulators etc. using diodes and BJTs.
		ES-EE191.6	To create the concept of Energy Band Theory and Fermi Levels to explain the operating principle of semiconductors.
1	Workshop/Manufacturing Practices (ES-ME192)	ES-ME192.1	To remember the use various tools, machines, devices used in engineering practice.
		ES-ME192.2	To understand carrying out various operations in mechanical engineering workshop.
		ES-ME192.3	To apply Adhere "Hands on" training and practice to students for use of various tools, devices, machines.
		ES-ME192.4	To analyze engineering skills and create objects from raw materials.
		ES-ME192.5	To evaluate and interpret job drawing, application of processes and operations to produce basic components from raw material.
		ES-ME192.6	To create measuring and practical skills in the trades.
1	Extra Curricular Activities(NSS/NCC/NSO etc) (XC181)	XC181.1	To remember awareness in social issues.
		XC181.2	To understand participate in mass education program.
		XC181.3	To apply some proposals for local slum area development and waste disposal.
		XC181.4	To analyze environmental awareness.
		XC181.5	To evaluate and participate in relief and rehabilitation work during natural calamities.
		XC181.6	To create production oriented programmes.

2	Chemistry-I (BS-CH201)	BS-CH201.1	To remember the theory based ideas in thermodynamics and its importance in engineering.
		BS-CH201.2	To understand the theory based ideas in electrochemistry and its importance in engineering.
		BS-CH201.3	To apply the theory based ideas in industrial chemistry and polymer chemistry and its importance in engineering.
		BS-CH201.4	To analyze the theory based ideas in Solid state chemistry and its importance in engineering.
		BS-CH201.5	To evaluate the theory based ideas in organic reaction mechanism.
		BS-CH201.6	To create conceptual and analyzing skills in solving broad range problems.
2	Mathematics-II (BS-M201)	BS-M201.1	To remember ODE of 1st order & 1st degree.
		BS-M201.2	To understand some special cases of 2nd order ODE and simultaneous linear ODE of Basic graph theory, matrix representation of graphs.
		BS-M201.3	To apply Trees and simple tree algorithms.
		BS-M201.4	To analyze improper integrals & their convergence.
		BS-M201.5	To evaluate Laplace Transform and application on ODE.
2	Programming for Problem Solving (ES-CS201)	ES-CS201.1	To remember problems, design and implementing algorithmic solutions.
		ES-CS201.2	To understand and trace the execution of programs written in C language.
		ES-CS201.3	To apply the C code using a modular approach and recursive concepts.
		ES-CS201.4	To analyze the dynamics of memory by the use of pointers and create/update basic data files.
		ES-CS201.5	To evaluate C Programs for problems.
		ES-CS201.6	To create and execute C programs for simple applications.
2	English (HM-HU201)	HM-HU201.1	To remember advanced skills of technical communication in English.
		HM-HU201.2	To understand them to communicate confidently and competently in English language in all spheres.
		HM-HU201.3	To apply writing competence- technical report, business letters, job applications etc.
		HM-HU201.4	To analyze reading comprehension skill through non-technical texts.
		HM-HU201.5	To evaluate conversation practice: face to face and via media.
2	Programming for Problem Solving Laboratory	ES-CS291.1	To remember a document using MS_WORD.
		ES-CS291.2	To understand and compute the data using Spread Sheet.
		ES-CS291.3	To apply the basic elements of a C program including arithmetic and logical operators, functions, control structures, and arrays

Semester	Course Title (Code)	CO Codes	Course Outcomes (COs)
	(ES-CS291)	ES-CS291.4	To analyze a walk-through of a program containing pointers, Structures, Unions and File Concepts.
		ES-CS291.5	To evaluate a program related to challenging questions.
		ES-CS291.6	To create and execute C programs for simple applications.
2	Chemistry-I Laboratory (BS-CH291)	BS-CH291.1	To remember hardness of water helps students to learn the basics of experiments to apply in day to day life as well as in industry.
		BS-CH291.2	To understand redox potential and apply in day to day life as well as in industry.
		BS-CH291.3	To apply the alkalinity of water helps students to learn the basics of experiments to apply in day to day life as well as in industry.
		BS-CH291.4	To analyze the viscosity of liquid helps students to learn the basics of experiments to apply in day to day life as well as in industry.
		BS-CH291.5	To evaluate the pH and conductance with the help of instruments of given samples e.g. tea, fruit juices, soil etc.
		BS-CH291.6	To create two heterogeneous liquid solutions and determine the distribution of solvent among them.
2	Engineering Graphics & Design Laboratory (ES-ME291)	ES-ME291.1	To remember free hand sketching of basic geometrical constructions and multiple views of objects.
		ES-ME291.2	To understand orthographic projection of lines and plane surfaces.
		ES-ME291.3	To apply projections and solids and development of surfaces.
		ES-ME291.4	To analyze isometric and perspective sections of simple solids.
		ES-ME291.5	To evaluate computer aided drafting.
		ES-ME291.6	To create graphic skills for communication of concepts, ideas and design of Engineering products.
2	Language Laboratory (HM-HU291)	HM-HU291.1	To remember 'listening skill', 'speaking skill' and its sub skills through language lab audio device.
		HM-HU291.2	To understand conversation sessions to internalize basic intervention by using correct body language.
		HM-HU291.3	To apply 'reading skills' and its sub skills using visual/ graphics/ diagrams.
		HM-HU291.4	To analyze global/ contextual/ inferential comprehension.
		HM-HU291.5	To evaluate different master linguistic and paralinguistic features.
		HM-HU291.6	To create topic for group discussion through audio visual input and acquaint with key strategies for success.
3	Digital Electronics (ESC-301)	ESC-301.1	To remember differences between number systems and describe some different codes.
		ESC-301.2	To understand the function of basic digital combinatorial circuits and sequential circuits.
		ESC-301.3	To apply the behavior of digital components.
		ESC-301.4	To analyze and construct both combinational and sequential networks.
		ESC-301.5	To evaluate different types of programmable logic devices.
		ESC-301.6	To create the functions, characteristics and structure of different memory systems.
3	Data Structure & Algorithms (PCC-CSBS301)	PCC-CSBS301.1	To remember data types, array, pointers, memory allocation Techniques.
		PCC-CSBS301.2	To understand the concepts of linear, non-linear data structure such as stacks, queues, trees and graphs.
		PCC-CSBS301.3	To apply various data structure to solve computing problems using C-programming language
		PCC-CSBS301.4	To analyze different algorithms, their advantages and disadvantages, choose appropriate data
		PCC-CSBS301.5	To evaluate different algorithms, their advantages and disadvantages, choose appropriate data structure as applied to specified problem definition
		PCC-CSBS301.6	To create the best case, average case and worst case time complexities of different algorithms.
3	Discrete Mathematics (PCC-CSBS302)	PCC-CSBS302.1	To remember boolean algebra and truth tables.
		PCC-CSBS302.2	To understand logic gates.
		PCC-CSBS302.3	To apply the concepts of abstract algebra.
		PCC-CSBS302.4	To analyze the concepts of combinatorics.
		PCC-CSBS302.5	To evaluate graphs.
		PCC-CSBS302.6	To create propositional calculus.
		HSMC-301.1	To remember financial statements, their importance and usages
		HSMC-301.2	To understand major principles of financial accounting, cost accounting and financial management

Semester	Course Title (Code)	CO Codes	Course Outcomes (COs)
3	Economics for Engineers (HSMC-301)	HSMC-301.3	To apply the tools and techniques for economic analysis of alternative opportunities, considering time value of money and risk associated with returns
		HSMC-301.4	To analyze investment opportunities considering forthcoming changes in economy, including inflation and their effect
		HSMC-301.5	To evaluate the opportunities with proper justifications
		HSMC-301.6	To create optimal engineering investment decisions
3	Computational Statistics (BSC-301)	BSC-301.1	To remember of the basics of statistical calculations.
		BSC-301.2	To understand Multivariate Normal Distribution and different models of Multiple Linear Regression Model
		BSC-301.3	To apply Multivariate Regression
		BSC-301.4	To analyze Discriminant Analysis and Principal Component Analysis
		BSC-301.5	To evaluate Factor Analysis models.
		BSC-301.6	To create Cluster Analysis
3	Digital Electronics Laboratory (ESC-391)	ESC-391.1	To remember differences between the combinational and sequential circuits.
		ESC-391.2	To understand the merits and demerits of the different amplifiers and must be able ;
		ESC-391.3	To apply various transistors related applications
		ESC-391.4	To analyze various number systems
		ESC-391.5	To evaluate multi-vibrator circuits using 555 timers
		ESC-391.6	To create problems related to Boolean algebra, minimization problems etc.
3	Data Structure & Algorithms Laboratory (PCC-CSBS391)	PCC-CSBS391.1	To remember basic C Programming such as Array, Structure, Pointer and File etc.
		PCC-CSBS391.2	To understand implementation concepts of linear and non-linear data structures.
		PCC-CSBS391.3	To apply the concepts of static and dynamic data structure algorithms.
		PCC-CSBS391.4	To analyze different sorting and searching algorithms.
		PCC-CSBS391.5	To evaluate time complexity of different data structure algorithms.
		PCC-CSBS391.6	To create different Data Structures which plays a vital role in real world applications.
3	Computational Statistics Laboratory (BSC-391)	BSC-391.1	To remember logical, relational and arithmetical operations.
		BSC-391.2	To understand python programming concepts.
		BSC-391.3	To apply file operations.
		BSC-391.4	To analyze different graphs.
		BSC-391.5	To evaluate regression models.
		BSC-391.6	To create PCA and linear discriminant models.
4	Introduction to Innovation, IP Management & Entrepreneurship (HSMC-401)	HSMC-401.1	To remember fundamentals of management studies.
		HSMC-401.2	To understand intellectual property rights.
		HSMC-401.3	To apply Entrepreneurship using proper financial planning.
		HSMC-401.4	To analyze be familiar with creative and innovative thinking styles
		HSMC-401.5	To evaluate investigate, understand and internalize the process of founding a startup
		HSMC-401.6	To create various types of IPR to protect competitive advantage
4	Formal Language & Automata Theory (PCC-CSBS401)	PCC-CSBS401.1	To remember the concept of object oriented programming that helps to organize complex programs.
		PCC-CSBS401.2	To understand of the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements;
		PCC-CSBS401.3	To apply a competence to design, write, compile, test and execute straightforward programs using a high level Language and also applying the knowledge of OOP.
		PCC-CSBS401.4	To analyze the complex problems and provide awareness of the need for a professional approach to design and the importance of good documentation to the finished programs.
		PCC-CSBS401.5	To evaluate implement, compile, test and run Java programs comprising more than one class, to address a particular software problem, and also able to evaluate solution of the complex programs as well as student will able to know the concept of parallel code execution through the concept of multithreading.

Semester	Course Title (Code)	CO Codes	Course Outcomes (COs)
		PCC-CSBS401.6	To create the ability to employ various types of selection constructs in a Java program. Be able to employ a hierarchy of Java classes to provide a solution to a given set of requirements and also get exposure of developing the web application which is the essential technology in modern era.
4	Object Oriented Programming (PCC-CSBS402)	PCC-CSBS402.1	To remember an object oriented approach to programming and identify potential benefits of object-oriented programming over other approaches.
		PCC-CSBS402.2	To understand the code and write the classes which work like built.in types.
		PCC-CSBS402.3	To apply applications which are easier to debug, maintain and extend.
		PCC-CSBS402.4	To analyze to compare object-oriented concepts in real world applications.
		PCC-CSBS402.5	To evaluate the philosophy of object-oriented design and the concepts of encapsulation, abstraction, inheritance, and polymorphism
		PCC-CSBS402.6	To create Design, implement, and test the implementation of "is-a" relationships among objects using a class hierarchy and inheritance
4	Computer Organisation & Architecture (PCC-CSBS403)	PCC-CSBS403.1	To remember Regular languages and finite automata. To recognize and manipulate representations of numbers stored in digital computers. Recall the history and development of modern computers, developing an appreciation for the potential and directions for future changes. To define the Flynn's classification of computer architecture SISD, SIMD, MISD, MIMD.
		PCC-CSBS403.2	To understand the computations of the functional units of the processor. To explain how computer hardware has evolved to meet the needs of multi-processing systems.
		PCC-CSBS403.3	To apply the internal organization of computers, CPU, memory unit and Input/Outputs and the relations between its main components. To construct a wide variety of memory technologies both internal and external and also able to Compute CPU and memory performance.
		PCC-CSBS403.4	To analyze cost performance and design trade-offs in designing and constructing a computer processor including memory. To analyze the basics of, and develop the ability to determine the applicability of single-cycle (MIPS), multi-cycle (MIPS), parallel, pipelined, superscalar, and RISC/CISC architectures. To compare array processor and vector processors both in terms of parallelism in SIMD architecture.
		PCC-CSBS403.5	To evaluate elementary quantitative performance of computer systems. To evaluate different types of systems: pipelined, super-scalar, super-pipelined, super. scalar–super, pipelined architecture.
		PCC-CSBS403.6	To create elementary problems by assembly language programming. To design the hardware of multiprocessors including cache coherence and synchronization.
4	Biology (BSC401)	BSC401.1	To remember fundamental knowledge of scientific discipline and biological principles
		BSC401.2	To understand the ability to work effectively as a member of an interdisciplinary team on complex problems involving multiple competing stakeholders and agenda.
		BSC401.3	To apply effectively about complex environmental problems.
		BSC401.4	To analyze emerging environmental issues that are sustainable.
		BSC401.5	To evaluate solutions for both specialist and general audiences with equal facility.
		BSC401.6	To create health related issues, and how to maintain / restore the environment.
4	Environmental Science (MC401)	MC401.1	To remember basic knowledge of Environmental science.
		MC401.2	To understand the natural environment and its relationships with human activities.
		MC401.3	To apply the fundamental knowlegde of science and engineering.
		MC401.4	To analyze environmental and health risk.
		MC401.5	To evaluate environmental laws and regulations to develop guidelines and procedures for health and safety issues.
		MC401.6	To create scientific problem solving related to air, water, noise and land pollution.
4	Design Thinking (ESC481)	ESC481.1	To remember the importance of design thinking.
		ESC481.2	To understand the phases in the design thinking process.
		ESC481.3	To apply the steps required to complete each phase in design thinking process.
		ESC481.4	To analyze each phase in design thinking process.
		ESC481.5	To evaluate doodling and storytelling in presenting ideas and prototypes.
		ESC481.6	To create value proposition statements as part of their presentations.

Semester	Course Title (Code)	CO Codes	Course Outcomes (COs)
4	Object Oriented Programming with C++ Laboratory (PCC492)	PCC492.1	To remember the practical concept of OOP and various aspect of OOP in through programming.
		PCC492.2	To understand to learn about , how to write, compile & execute basic java program which are essential for programming.
		PCC492.3	To apply to learn about the effective program writing in the environment of Object Oriented Concept.
		PCC492.4	To analyze that how to use OOP to simplify complex programs and also got knowledge about the advantage of using Object Oriented Programming over Process Oriented Programming.
		PCC492.5	To evaluate practical exposure about the use of threads, handle exceptions and write applets and also about the use of interfaces and inner classes, wrapper classes, generics and that will help to develop projects over OOP(in C++).
		PCC492.6	To create to get sense about the web project that will be helpful for them in future to develop the web application.
4	Computer Organization & Architecture Laboratory (PCC493)	PCC493.1	To remember the detailing of VHDL simulation and internal configuration of FPGA.
		PCC493.2	To understand major syntactic elements of VHDL entities, architectures, processes, functions, common concurrent statements, and common sequential statements.
		PCC493.3	To apply user defined subprograms, packages using VHDL program.
		PCC493.4	To analyze behavioral and structural coding styles of VHDL program.
		PCC493.5	To evaluate the VHDL test bench and use it to test/verify a sequential VHDL design of moderate complexity.
		PCC493.6	To create combinational logic and sequential logic circuit by using VHDL programming, as well as an awareness of timing and resource usage.
5	Computer Networks (PCC-CSBS501)	PCC-CSBS501.1	To remember the concepts of protocols, network interfaces, network models and design/performance issues in local area networks and wide area networks.
		PCC-CSBS501.2	To understand basic computer network technology, explain Data Communications System and its components and to identify the different types of network devices and their functions within a network.
		PCC-CSBS501.3	To apply the main problems related to error control, flow control, MAC and addressing, routing.
		PCC-CSBS501.4	To analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.
		PCC-CSBS501.5	To evaluate why networks need security and control, what errors might occur, and how to control network errors.
		PCC-CSBS501.6	To create and identify deficiencies in existing protocols, and then go onto formulate new and better protocols.
5	Software Engineering (ESC-CSBS501)	ESC-CSBS501.1	To remember the knowledge of the distinction between critical and non-critical systems.
		ESC-CSBS501.2	To understand the ability to manage a project including planning, scheduling, and testing and risk assessment/management.
		ESC-CSBS501.3	To apply a software requirements document and demonstrate an understanding of the proper contents of a software requirements document.
		ESC-CSBS501.4	To analyze an understanding of the differences between real-time and non-real time systems.
		ESC-CSBS501.5	To evaluate specific components of a software design that can be targeted for reuse.
		ESC-CSBS501.6	To create a software testing plan and demonstrate proficiency in software development cost estimation.
5	Data Base Management Systems (PCC-CSBS502)	PCC-CSBS502.1	To remember the terminology, features, classifications, and characteristics embodied in database systems.
		PCC-CSBS502.2	To understand an understanding of relational database using normalization theory.
		PCC-CSBS502.3	To apply an information model into a relational database schema and to apply a data definition language, data manipulation language and/or utilities to implement the schema using a SQL.
		PCC-CSBS502.4	To analyze an information storage problem and derive an information model expressed in the form of an entity relationship diagram and other optional analysis forms, such as a data dictionary.
		PCC-CSBS502.5	To evaluate the query optimization and transaction processing schemes.
		PCC-CSBS502.6	To create a broad range of query problems using relational algebra and relational calculus solutions.
5	Business Strategy (HSMC-CSBS501)	HSMC-CSBS501.1	To remember the concepts of strategic management.
		HSMC-CSBS501.2	To understand the nature of strategic management in competitive and institutional landscape.
		HSMC-CSBS501.3	To apply a holistic approach to see business issues comprehensively.
		HSMC-CSBS501.4	To analyze core and functional subject knowledge for decision-making.

Semester	Course Title (Code)	CO Codes	Course Outcomes (COs)
		HSMC-CSBS501.5	To evaluate and interpret the critical challenges and opportunities before an organization.
		HSMC-CSBS501.6	To create the concepts of strategic management and understand its nature in competitive and institutional landscape.
5	Machine Learning (ESC-CSBS502)	ESC-CSBS502.1	To remember the concepts of various machine learning strategies.
		ESC-CSBS502.2	To understand computational data and learn ANN learning models.
		ESC-CSBS502.3	To apply real world applications by selecting suitable learning model.
		ESC-CSBS502.4	To analyze the performance of the model by combining results from different approaches.
		ESC-CSBS502.5	To evaluate and classify sequencing patterns using HMM.
		ESC-CSBS502.6	To create the association and relationship between the data objects. Construct machine learning model for unseen data and can solve real world application.
5	Artificial Intelligence (PEC-CSBS501B)	PEC-CSBS501B.1	To remember and identify the basics of the theory and practice of Artificial Intelligence as a discipline about intelligent agents capable of deciding what to do, and do it.
		PEC-CSBS501B.2	To understand and compare different AI algorithm, to understand the knowledge representation scheme, to infer knowledge.
		PEC-CSBS501B.3	To apply knowledge representation techniques and problem solving strategies to common AI applications.
		PEC-CSBS501B.4	To analyze and analyze different knowledge representation scheme, search algorithm, learning algorithm.
		PEC-CSBS501B.5	To evaluate self-learning and research skills to be able to tackle a topic of interest on his/her own or as part of a team.
		PEC-CSBS501B.6	To create a problem, and identify and define the computing requirements appropriate to its solution. To construct a simple software to experiment with various AI concepts and analyze results.
5	Constitution of India (MC-CSBS501)	MC-CSBS501.1	To remember fundamental rights and duties.
		MC-CSBS501.2	To understand union government and its administration.
		MC-CSBS501.3	To apply lok sabha and rajya sabha activities.
		MC-CSBS501.4	To analyze the role of state government and its administration governor.
		MC-CSBS501.5	To evaluate local ad ministration and district administration.
		MC-CSBS501.6	To create the activities of election commission
5	Computer Networks Laboratory (PCC-CSBS591)	PCC-CSBS591.1	To remember to identify and use various networking components and able to learn various networking commands.
		PCC-CSBS591.2	To understand different transmission media and design cables for establishing a network.
		PCC-CSBS591.3	To apply a network system consists of various computers using NIC, networking cables, connector, hubs and switches.
		PCC-CSBS591.4	To analyze the basic concepts of network and application layer protocol design; including client/server models, peer to peer models and able to implement inter process communication and message passing.
		PCC-CSBS591.5	To evaluate networking in software using various socket programming and also able to learn how to implement various networking protocols.
		PCC-CSBS591.6	To create the major software and hardware technologies used on computer networks and able to implement device sharing on network.
5	Database Management Systems Laboratory (PCC-CSBS592)	PCC-CSBS592.1	To remember conceptual understanding of database management system. Ability to create database tables
		PCC-CSBS592.2	To understand and formulate SQL queries based on the problems given
		PCC-CSBS592.3	To apply time effective solutions. Ability to apply PL/SQL
		PCC-CSBS592.4	To analyze understanding of different applications and constructs of SQL PL/SQL
		PCC-CSBS592.5	To evaluate how a real world problem can be mapped to schemas. Embedded and Nested Queries.
		PCC-CSBS592.6	To create different applications and constructs of SQL PL/SQL to recommend various industry oriented and real life applications. Handling online Transactions.
5	Software Engineering Laboratory (ESC591)	ESC591.1	To remember Indicate, design and construct application using CASE tools.
		ESC591.2	To understand and Translate a requirement specification into an implementable design, following a structured and organized process
		ESC591.3	To apply some of the main risks of software development use it in development process.
		ESC591.4	To analyze Employ group working skills including general organization, planning and time management and inter group negotiation.

Semester	Course Title (Code)	CO Codes	Course Outcomes (COs)
		ESC591.5	To evaluate Formulate testing strategy for a software system, employing techniques such as unit testing, test driven development and functional testing.
		ESC591.6	To create software applications in a development environment that makes use of commonly supported tools.
6	Design & Analysis of Algorithms (PCC-CSBS601)	PCC-CSBS601.1	To remember various advanced design and analysis techniques such as greedy algorithms, dynamic programming & know the concepts of tractable and intractable problems and the classes P, NP and NP complete problems
		PCC-CSBS601.2	To Understand how the worst case time complexity of an algorithm is defined, how asymptotic notation is used to provide a rough classification of algorithms, the difference between the lower and upper bounds of various problems and their importance in deciding the optimality of an algorithm.
		PCC-CSBS601.3	To apply the problem related to Divide and Conquer, Dynamic programming, Backtracking and Greedy method, solve problem related to String matching, problem related to network flow with the help of Ford Fulkerson algorithm, matrix multiplication problem with the help of Strassen's matrix manipulation algorithm, problem related to Clique decision problem, the problem related to vertex cover problem, travelling salesman problem.
		PCC-CSBS601.4	To Analyze the complexity/performance of different algorithms using different computational models, order notation and various complexity measures.
		PCC-CSBS601.5	To Evaluate different algorithms related to Divide and Conquer, Dynamic programming, Backtracking and Greedy method, Ford Fulkerson algorithm for network flow and vertex cover problem, travelling salesman problem.
		PCC-CSBS601.6	To create efficient algorithms by comparing existing algorithms with their problems for fundamental problems in computer science and engineering work.
6	Operating Systems (PCC-CSBS602)	PCC-CSBS602.1	To remember the basic principles of operating systems and compare different styles of operating systems
		PCC-CSBS602.2	To understand the main principles and techniques for the implementation of processes, threads as well as the different algorithms for process scheduling and inter process communication
		PCC-CSBS602.3	To apply the main problems related to concurrency and the different synchronization mechanisms.
		PCC-CSBS602.4	To analyze the device and I/O management functions in operating systems as part of a uniform device abstraction.
		PCC-CSBS602.5	To evaluate the rationale view for virtual memory abstractions and explain the disk organization and file system structure
		PCC-CSBS602.6	To create security risks in operating systems and justify the role of operating systems in establishing security.
6	Pattern Recognition (ESC-CSBS601)	ESC-CSBS601.1	To remember the basics of patterns.
		ESC-CSBS601.2	To understand distinct procedures of decision making in realtime.
		ESC-CSBS601.3	To apply different models for analysis and estimation.
		ESC-CSBS601.4	To analyse classifier and clustering techniques.
		ESC-CSBS601.5	To evaluate algorithms using metric and non-metric methods.
		ESC-CSBS601.6	To create linear and non-linear patterns for machine learning.
6	Cloud Computing (PEC-CSBS601C)	PEC-CSBS601C.1	To remember the principles of cloud based services.
		PEC-CSBS601C.2	To understand computing services and storage resources through access to data and business applications stored on servers at remote locations.
		PEC-CSBS601C.3	To apply service based knowledge in software, infrastructure and platform.
		PEC-CSBS601C.4	To analyze system performance of distributed networks in respect of services.
		PEC-CSBS601C.5	To evaluate web service components maintaining security.
		PEC-CSBS601C.6	To create service oriented architecture and its applications.
6	Software Design with UML (PEC-CSBS602D)	PEC-CSBS602D.1	To remember the fundamentals of object modelling.
		PEC-CSBS602D.2	To understand and differentiate Unified Process from other approaches.
		PEC-CSBS602D.3	To apply with static UML diagrams.
		PEC-CSBS602D.4	To analyze with UML dynamic and implementation diagrams.
		PEC-CSBS602D.5	To evaluate software design with design patterns.



Semester	Course Title (Code)	CO Codes	Course Outcomes (COs)
		PEC-CSBS602D.6	To create software against its requirements specification.
6	Big Data Analytics (OEC-CSBS601A)	OEC-CSBS601A.1	To remember aggregation, database, and distribution models.
		OEC-CSBS601A.2	To understand big data for business intelligence.
		OEC-CSBS601A.3	To apply business case studies for big data analytics.
		OEC-CSBS601A.4	To analyze nosql big data management.
		OEC-CSBS601A.5	To evaluate map-reduce analytics using Hadoop and related tools.
		OEC-CSBS601A.6	To create HDFS.
6	Introduction to Industrial Management (HSMC-CSBS601)	HSMC-CSBS601.1	To remember organization structure, culture, climate and major provisions of factory acts and laws.
		HSMC-CSBS601.2	To understand material requirement planning and store keeping procedure.
		HSMC-CSBS601.3	To apply graph Plotting and analyze inventory control models and techniques.
		HSMC-CSBS601.4	To analyze CPM and PERT for given activities.
		HSMC-CSBS601.5	To evaluate PPC functions.
		HSMC-CSBS601.6	To create recent Trends in IM.
6	Design Analysis & Algorithm Laboratory (PCC-CSBS691)	PCC-CSBS691.1	To remember basic data structures for searching and sorting, trees, heaps, and the computational complexity of the searching and sorting algorithms that use these structures.
		PCC-CSBS691.2	To understand basic graph algorithms and their computational complexity.
		PCC-CSBS691.3	To apply the correctness and analyse the running time of the basic algorithms for those classic problems in various domains.
		PCC-CSBS691.4	To analyze algorithm and compare, contrast, & choose appropriate algorithmic design techniques to present an algorithm that solves a given problem.
		PCC-CSBS691.5	To evaluate an algorithm in any programming language by choosing the appropriate data structure.
		PCC-CSBS691.6	To create a new algorithm or they can modify the existing algorithm by choosing exact data structures to support specific applications.
6	Operating Systems Laboratory (PCC-CSBS692)	PCC-CSBS692.1	To remember basic UNIX/LINUX Commands
		PCC-CSBS692.2	To understand the codes in the Shell Programming
		PCC-CSBS692.3	To apply on process creation synchronization, Inter process communication including shared memory, pipes and messages.
		PCC-CSBS692.4	To analyze the codes using UNIX/LINUX System calls.
		PCC-CSBS692.5	To evaluate of CPU Scheduling Algorithms like FCFS, RR, SJF, Priority, Multilevel Queuing and Banker's Algorithm for Deadlock Avoidance, Prevention.
		PCC-CSBS692.6	To create the FIFO, LRU, and OPTIMAL page replacement algorithms.
7	Introduction to IoT (PEC-CSBS701A)	PEC-CSBS701A.1	To remember basic concepts of IoT.
		PEC-CSBS701A.2	To understand different IoT architectures and data stream process.
		PEC-CSBS701A.3	To apply different Sensors and Industrial Systems.
		PEC-CSBS701A.4	To analyze network architecture and Communication for IoT
		PEC-CSBS701A.5	To evaluate IoT applications and process data.
		PEC-CSBS701A.6	To create IoT data storage for dealing with noisy and missing data, and to detect anomaly.
7	Financial & Cost Accounting (HSMC-CSBS701)	HSMC-CSBS701.1	To remember basic accounting fundamentals.
		HSMC-CSBS701.2	To understand accounting process.
		HSMC-CSBS701.3	To apply an awareness about the importance and usefulness of the accounting concepts and their managerial implications.
		HSMC-CSBS701.4	To analyze an understanding of the financial statements and the underlying principles and learn to interpret financial statements.
		HSMC-CSBS701.5	To evaluate awareness about cost accounting, different types of costing and cost management.
		HSMC-CSBS701.6	To create Cash Flow and Fund Flow Techniques.
		HSMC-CSBS702.1	To remember the understanding of the concept of human resource management and to understand its relevance in organizations.

Semester	Course Title (Code)	CO Codes	Course Outcomes (COs)
7	Human Resource Management (HSMC-CSBS702)	HSMC-CSBS702.2	To understand necessary skill set for application of various HR issues.
		HSMC-CSBS702.3	To apply the strategic issues and strategies required to select and develop manpower resources.
		HSMC-CSBS702.4	To analyze the knowledge of HR concepts to take correct business decisions.
		HSMC-CSBS702.5	To evaluate Performance Appraisal Systems.
		HSMC-CSBS702.6	To create Discipline Management.
7	IT Workshop Matlab (PCC-CSBS791)	PCC-CSBS791.1	To remember the basic fundamentals of Matlab.
		PCC-CSBS791.2	To understand vector, matrix, array and mathematical operations.
		PCC-CSBS791.3	To apply different files and commands.
		PCC-CSBS791.4	To analyze conditional statements and loop.
		PCC-CSBS791.5	To evaluate different 2D plotting with built-in functions.
		PCC-CSBS791.6	To create usage of 3D plotting.
7	Project Evaluation I (PCC-CSBS781)	PCC-CSBS781.1	To remember the programming language concepts, particularly Java and object-oriented concepts or go through research activities.
		PCC-CSBS781.2	To understand, Plan, analyze, design and implement a software project or gather knowledge over the field of research and design or plan about the proposed work.
		PCC-CSBS781.3	To apply the ability to locate and use technical information from multiple sources.
		PCC-CSBS781.4	To analyze the ability to communicate effectively in speech and writing.
		PCC-CSBS781.5	To evaluate to learn 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.
		PCC-CSBS781.6	To create appropriate process of learn and go through the software development cycle with emphasis on different processes - requirements, design, and implementation phases.
8	Cryptology (PEC-CSBS801A)	PEC-CSBS801A.1	To remember knowledge in security issues, services, goals and mechanism
		PEC-CSBS801A.2	To understand the basic concept of Cryptography and Network Security, their mathematical models
		PEC-CSBS801A.3	To apply Encryption and decryption of messages using block ciphers. Sign and verify messages using well.known signature generation and verification algorithms
		PEC-CSBS801A.4	To analyze existing authentication protocols for two party communications and Analyze key agreement algorithms to identify their weaknesses
		PEC-CSBS801A.5	To evaluate the ethical issues related to the misuse of computer security
		PEC-CSBS801A.6	To create code to implement a new cryptographic algorithm or write an analysis report on any existing security product
8	Business Communication & Value Science (OEC-CSBS801A)	OEC-CSBS801A.1	To remember the need for life skills and values.
		OEC-CSBS801A.2	To understand own strengths and opportunities.
		OEC-CSBS801A.3	To apply the importance of vocabulary enrichment.
		OEC-CSBS801A.4	To analyze the basic tenets of communication and apply the basic communication practices in different types of communication.
		OEC-CSBS801A.5	To evaluate how stress impacts life and work and identify the best practices to manage Stress.
		OEC-CSBS801A.6	To create the importance of time management and identify the best practices.
8	Services Science & Service Operational Management (HSMC-CSBS801)	HSMC-CSBS801.1	To remember the fundamentals of management and operations research.
		HSMC-CSBS801.2	To understand concepts about Services and distinguish it from Goods.
		HSMC-CSBS801.3	To apply characteristics and nature of Services.
		HSMC-CSBS801.4	To analyze ways to design Services and evaluate them using Service qualities.
		HSMC-CSBS801.5	To evaluate how various methods can be used to operate and manage Service businesses.
		HSMC-CSBS801.6	To create a process how innovation can be approached from Services point of view.
		PROJ-CSBS801.1	To remember basic concepts of research and its methodologies.

Semester	Course Title (Code)	CO Codes	Course Outcomes (COs)
8	Research Methodologies (PROJ-CSBS801)	PROJ-CSBS801.2	To understand appropriate research topics.
		PROJ-CSBS801.3	To apply appropriate research problem and parameters.
		PROJ-CSBS801.4	To analyze a project proposal (to undertake a project).
		PROJ-CSBS801.5	To evaluate research (advanced project) in a more appropriate manner.
		PROJ-CSBS801.6	To create a research report and thesis, and to write a research proposal (grants).
8	Project Evaluation II (PCC-CSBS882)	PCC-CSBS882.1	To remember programming language concepts, particularly Java or C# along with object oriented concepts as well as software engineering principles or go through the research work and gather knowledge over the field and develop an ability to apply them to software design of real life problems in an industry / commercial environment or propose methodology in the field of research.
		PCC-CSBS882.2	To understand plan, analyze, design a software project and demonstrate the ability to communicate effectively in speech and writing.
		PCC-CSBS882.3	To apply major software engineering topics and position them to lead medium sized software projects in industry or propose any new model over the selected field of research that will be useful for future activities.
		PCC-CSBS882.4	To analyze software development cycle with emphasis on different processes -requirements, design, and implementation phases and also learn details about different artifacts produced during software development.
		PCC-CSBS882.5	To evaluate different software development process models and how to choose an appropriate one for a project.
		PCC-CSBS882.6	To create a process for gaining confidence at having conceptualized, designed, and implemented a working, medium sized project with their team.