COURSE OUTCOME OF COMPUTER SCIENCE &ENGINEERING DEPARTMENT

1ST SEM

Department	Basic Science & Humanities (CSE)
Course Code	BS-PH-101
Title of Course	Physics-I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	44
Course Out Come	**CO1:** Ability to know the basic concepts of mechanics and oscillation. **CO2:** Elaborate the concept of optics and introduction to the principle of laser. **CO3:** Ability to understand electromagnetism, dielectric and magnetic properties of materials. **CO4:** Familiarize with the basic laws of quantum mechanics introduction to Schrodinger wave equation. **CO5:** Understand the basic concept of Statistical mechanics.

Department	Basic Science & Humanities (CSE)
Course Code	BS-M-101
Title of Course	Mathematics -IA
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	40
Course Out Come	**CO1**: Apply the concept integral calculus to determine curvature and evaluation of different types of improper integrals. **CO2:** Understand the domain of applications of mean value theorems, limit and maxima-minima to engineering problems. **CO3:** Understand the concept of determinant and learn different types of matrices, concept of rank, system of linear equations, methods of matrix inversion. **CO4:** Understand linear spaces, its basis and dimension with corresponding applications in the field of computer science. **CO5:** Learn and apply the concept of Eigen values, Eigen vectors, diagonalization of matrices and orthogonalization in inner product spaces for understanding physical and engineering problems

Department	Electrical Engineering(CSE)
Course Code	ES-EE101
Title of Course	Basic Electrical Engineering – 1
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	42
Course Out Come	**CO1:** To understand and analyze basic electric and magnetic circuits **CO2:** To study the working principles of electrical machines and power converters. **CO3:** To introduce the components of low voltage electrical installations

Department	Basic Science & Humanities (CSE)
Course Code	BS-PH-191
Title of Course	Physics-I Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	30
Course Out Come	**CO1**: Ability to understand the general property of matters like viscosity, Young's Modulus and Modulus of Rigidity. **CO2**: Ability to know optical property. **CO3**: Ability to learn electrical property. **CO4**: Ability to understand Quantum Physics with the help of experiments like Energy band gap of semiconductor, Planck constant and Characteristics of Solar Photovoltaic cell. **CO5**: Ability to learn Electricity and Magnetism with the help of experiments like Hall Effect of semiconductors, Specific charge of electron

Department	Electrical Engineering(CSE)
Course Code	ES-EE191
Title of Course	Basic Electrical Engineering – 1
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	30
Course Out Come	**CO1:** To understand and analyze basic electric and magnetic circuits **CO2:** To study the working principles of electrical machines and power converters. **CO3:** To introduce the components of low voltage electrical installations

Department	Mechanical Engineering(CSE)
Course Code	ES-ME191
Title of Course	Workshop/Manufacturing Practices
Nature of Course	Compulsory
Type of Course	Lecture + Practical
Contact Hours	1L+4P
Total Contact Hours	64
Course Out Come	CO1: **Concept** of Engineering materials and its physical, chemical and mechanical properties & applications. CO2: **Understand** different conventional manufacturing processes mainly covering basic principles, different methods and general applications. CO3: **Basic Concept** of forming/shapingand casting. CO4: **Understanding** various aspects of welding processes and its applications. CO5: **Practices** of elementary machining operations- Facing, Centering, Turning, Threading, Drilling, Boring, Shaping and Milling.

2ND SEM

Department	Basic Science & Humanities (CSE)
Course Code	BS-CH-201
Title of Course	Chemistry-1
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	42
Course Out Come	CO1:Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. CO2: Rationalise bulk properties and processes using thermodynamic considerations. CO3: **:** Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques. CO4: Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity. CO5: List major chemical reactions that are used in the synthesis of molecules.

Department	Basic Science & Humanities (CSE)
Course Code	BS-M-201
Title of Course	Mathematics -IIA
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	40

Course Out Come	**CO1:** Learn the ideas of probability and random variables, various discrete and continuous probability distributions with their properties and their applications in physical and engineering environment.
	CO2: Understand the basic ideas of statistics with different characterisation of a univariate and bivariate data set.
	CO3: Apply statistical tools for analysing data samples and drawing inference on a given data set.

Department	CSE
Course Code	ES-CS 201
Title of Course	Programming for Problem Solving
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	40
Course Out Come	**CO1:** Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
	CO2: Rationalise bulk properties and processes using thermodynamic considerations.
	CO3: Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
	CO4: Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
	CO5: List major chemical reactions that are used in the synthesis of molecules.

Department	Basic Science & Humanities (CSE)
Course Code	HM HU 201
Title of Course	English
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L
Total Contact Hours	25
Course Out Come	CO1: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking Skills.

Department	Basic Science & Humanities (CSE)
Course Code	BS-CH-291
Title of Course	Chemistry-1 Lab

Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	30
Course Out Come	**CO1:** Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. **CO2:** Rationalise bulk properties and processes using thermodynamic considerations. **CO3:** Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques. **CO4:** Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity. **CO5:** List major chemical reactions that are used in the synthesis of molecules.

Department	CSE
Course Code	ES-CS-291
Title of Course	Programming for Problem Solving
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4P
Total Contact Hours	30
Course Out Come	**CO1:** To formulate the algorithms for simple problems **CO2:** To translate given algorithms to a working and correct program **CO3:** To be able to correct syntax errors as reported by the compilers **CO4:** To be able to identify and correct logical errors encountered at run time **CO5:** To be able to write iterative as well as recursive programs **CO6:** To be able to represent data in arrays, strings and structures and manipulate them through a program **CO7:** To be able to declare pointers of different types and use them in defining self-referential structures. **CO8:** To be able to create, read and write to and from simple text files.

Department	Mechanical Engineering(CSE)
Course Code	ES-ME 291
Title of Course	Engineering Graphics & Design
Nature of Course	Compulsory

Type of Course	Practical
Contact Hours	1L+4P
Total Contact Hours	65
Course Out Come	CO1:Understanding and drawing of lines, lettering, dimensioning, scales and geometrical construction of curves. CO2: Learn projection of points, lines and surfaces and solids like cube, pyramid, prism, cylinder and cone. CO3: Drawing isometric view from orthogonal/sectional views of simple solid objects. CO4: Understand and draw full and half sectional views of solids and develop the cut surfaces of prism, cylinder and cone. CO5: To learn Computer Aided Drafting using AUTO-CAD.

Department	Basic Science & Humanities (CSE)
Course Code	HM HU 291
Title of Course	Language Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	19
Course Out Come	CO1: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking Skills.

3RD SEM

Department	ECE(CSE)
Course Code	ESC-CS301
Title of Course	Analog & Digital Electronics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	36
Course Outcome	CO1: Realize the basic operations of different analog components. CO2: Realize basic gate operations and laws Boolean algebra. CO3: Understand basic structure of digital computer, stored program concept and different arithmetic and control unit operations.

Department	CSE
Course Code	PCC-CS301
Title of Course	Data Structure & Algorithms
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	38
Course Outcome	CO1: Differentiate how the choices of data structure & algorithm methods impact the performance of program

	CO2: Solve problems based upon different data structure & also write programs.
	CO3: Identify appropriate data structure & algorithmic methods in solving problem.
	CO4: Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing.
	CO5: Compare and contrast the benefits of dynamic and static data structures implementations.

Department	CSE
Course Code	PCC-CS302
Title of Course	Computer Organisation
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	36
Course Outcome	CO1: Understand basic structure of digital computer, stored program concept and different arithmetic and control unit operations.
	CO2: Understand basic structure of different combinational circuits multiplexer, decoder, encoder etc.
	CO3: Perform different operations with sequential circuits.
	CO4: Understand memory and I/O operations.

Department	Basic Science & Humanities (CSE)
Course Code	BSC-301
Title of Course	Mathematics –III (Differential Calculus)
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L
Total Contact Hours	40
Course Out Come	**CO1:** Learn to apply the concept of sequence and convergence of infinite series in many approximation techniques in engineering disciplines.
	CO2: Apply the knowledge for addressing the real life problems which comprises of several variables or attributes and identify extremum points if different surfaces of higher dimensions and concept of vector differentiation.
	CO3: Learn the methods for evaluating multiple integral and their applications to different physical problems.
	CO4: Understand different techniques to solve first and second order ordinary differential equations with its formulation to address the modelling of systems and problems of engineering sciences.
	CO5: Learn Basics of Graph Theory which are useful to solve engineering problems.

Department	Basic Science & Humanities (CSE / IT)
Course Code	HS-MC-301
Title of Course	Economics for Engineers
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	36
Course Outcome	**CO1**: Ability to understand Economic Decisions Making and considering that students willlearn to find out Engineering Costs & Estimation. **CO2**: Ability to learn Cash Flow and also able to calculate Rate of Return Analysis. **CO3**: Ability to know Inflation and Price Change, Present Worth Analysis. **CO4**: Ability to learn depreciation and able to analysis the requirement of replacement.

Department	ECE(CSE)
Course Code	ESC391
Title of Course	Analog & Digital Electronics Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4P
Total Contact Hours	30
Course Out Come	CO1: Realize the basic operations of different analog components. CO2: Realize basic gate operations and laws Boolean algebra. CO3: Understand basic structure of digital computer, stored program concept and different arithmetic and control unit operations.

Department	CSE
Course Code	PCC-CS 391
Title of Course	Data Structure & Algorithm Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4P
Total Contact Hours	36
Course Out Come	CO1: Differentiate how the choices of data structure & algorithm methods impact the performance of program. CO2: Solve problems based upon different data structure & also write programs. CO3: Identify appropriate data structure & algorithmic methods in solving problem. CO4: Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing. CO5: Compare and contrast the benefits of dynamic and static data structures implementations.

Department	CSE
Course Code	PCC-CS 392
Title of Course	Computer Organisation Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4P
Total Contact Hours	32
Course Out Come	CO1: Understand basic structure of digital computer, stored program concept and different arithmetic and control unit operations. CO2: Understand basic structure of different combinational circuits multiplexer, decoder, encoder etc. CO3: Perform different operations with sequential circuits. CO4: Understand memory and I/O operations.

Department	CSE
Course Code	PCC-CS393
Title of the Course	IT Workshop (Sci Lab/MATLAB/Python/R)
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4
Total Contact Hours	32
Course Outcomes	CO1: To master an understanding of scripting & the contributions of scripting languages. CO2: Design real life problems and think creatively about solutions. CO3: Apply a solution in a program using R/Matlab/Python. CO4: To be exposed to advanced applications of mathematics, engineering and natural sciences to program real life problems.

4TH SEM

Department	CSE
Course Code	PCC-CS401
Title of the Course	Discrete Mathematics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L+1T
Total Contact Hours	36
Course Outcomes	CO1: Express a logic sentence in terms of predicates, quantifiers, and logical connectives. CO2: Derive the solution for a given problem using deductive logic and prove the solution based on logical inference. CO3: Classify its algebraic structure for a given a mathematical problem. CO4: Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.

	CO5: Develop the given problem as graph networks and solve with techniques of graph theory.

Department	CSE
Course Code	PCC-CS402
Title of the Course	Computer Architecture
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	33
Course Outcomes	CO1: Learn pipelining concepts with a prior knowledge of stored program methods. CO2: Learn about memory hierarchy and mapping techniques. CO3 Study of parallel architecture and interconnection network

Department	CSE
Course Code	PCC-CS403
Title of the Course	Formal Language & Automata Theory
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	37
Course Outcomes	CO1: Write a formal notation for strings, languages and machines. CO2: Design finite automata to accept a set of strings of a language. CO3: For a given language determine whether the given language is regular or not. CO4: Design context free grammars to generate strings of context free language. CO5: Determine equivalence of languages accepted by Push Down Automata and languages generated by context free grammars CO6: Write the hierarchy of formal languages, grammars and machines. CO7: Distinguish between computability and non-computability and Decidability and undecidability.

Department	CSE
Course Code	PCC-CS404
Title of the Course	Design and Analysis of Algorithms
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	CO1: For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms. CO2: Describe the greedy paradigm and

	explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms. CO3: Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation. CO4: Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming. CO5: develop the dynamic programming algorithms, and analyze it to determine its computational complexity. CO6: For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems. CO7: Explain the ways to analyze randomized algorithms (expected running time, probability of error). CO8: Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS and FPTAS) .

Course Code	BSC-401
Title of Course	Biology
Department	Basic Science & Humanities (CSE)
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L + 1T
Total Contact Hours	33
Course Out Come	**CO1**: Describe how biological observations of 18th Century that lead to major discoveries. **CO2**: Convey that classification per section is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological. **CO3**: Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring. **CO4**: Convey that all forms of life have the same building blocks and yet the

manifestations are as diverse as one can imagine.

CO5: Classify enzymes and distinguish between different mechanisms of enzyme action.

CO6: Identify DNA as a genetic material in the molecular basis of information transfer.

CO7: Analyse biological processes at the reductionistic level.

CO8: Apply thermodynamic principles to biological systems.

CO9: Identify and classify microorganisms.

Department	CSE
Course Code	MC-401
Title of the Course	Environmental Sciences
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	1L
Total Contact Hours	40
Course Outcomes	CO1: To understand the natural environment and its relationships with human activities. CO2: To apply the fundamental knowledge of science and engineering to assess environmental and health risk. CO3: To develop guidelines and procedures for health and safety issues obeying the environmental laws and regulations. CO4: Acquire skills for scientific problem-solving related to air, water, noise& land pollution.

Department	CSE
Course Code	PCC-CS492
Title of the Course	Computer Architecture Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4P
Total Contact Hours	32
Course Outcomes	CO1: Learn pipelining concepts with a prior knowledge of stored program methods. CO2: Learn about memory hierarchy and

	mapping techniques. CO3 Study of parallel architecture and interconnection network.

Department	CSE
Course Code	PCC-CS494
Title of the Course	Design & Analysis Algorithm Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4P
Total Contact Hours	36
Course Outcomes	CO1: For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms. CO2: Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms. CO3: Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation. CO4: Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming. CO5: develop the dynamic programming algorithms, and analyze it to determine its computational complexity. CO6: For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems. CO7: Explain the ways to analyze randomized algorithms (expected running time, probability of error). CO8: Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS and FPTAS).

Department	ECE(CSE)
Course Code	ESC-501
Title of the Course	Signals & Systems
Nature of Course	LECTURE
Type of Course	COMPULSORY
Contact Hours	3L
Total Contact Hours	30
Course Outcomes	CO1: Understand the concepts of continuous time and discrete time systems. CO2: Understand sampling theorem and its implications. CO3: Analyse systems in complex frequency domain. CO4: Understand the concepts of continuous time and discrete time systems.

Department	CSE
Course Code	PCC-CS501
Title of the Course	Compiler Design
Nature of Course	LECTURE
Type of Course	COMPULSORY
Contact Hours	3L
Total Contact Hours	45
Course Outcomes	CO1: Understand given grammar specification develop the lexical analyser. CO2: Design a given parser specification design top-down and bottom-up parsers. CO3: Develop syntax directed translation schemes. CO4: Develop algorithms to generate code for a target machine.

Department	CSE
Course Code	PCC-CS502
Title of the Course	Operating Systems
Nature of Course	LECTURE
Type of Course	COMPULSORY
Contact Hours	3L
Total Contact Hours	37
Course Outcomes	CO1: Create processes and threads. CO2: Develop algorithms for process

scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
CO3: For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time. Design and implement file management system.
CO4: For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

Department	CSE
Course Code	PCC-CS503
Title of the Course	Object Oriented Programming
Nature of Course	LECTURE
Type of Course	COMPULSORY
Contact Hours	3L
Total Contact Hours	34
Course Outcomes	CO1: Specify simple abstract data types and design implementations, using abstraction functions to document them. CO2: Recognise features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity. CO3: Name and apply some common object-oriented design patterns and give examples of their use. CO4: Design applications with an event-driven graphical user interface.

Department	CSE
Course Code	HSMC-501
Title of the Course	Introduction to Industrial Management (Humanities III)
Nature of Course	LECTURE
Type of Course	COMPULSORY
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	CO1: Interpret given organization structure, culture, climate and major provisions of

factory acts and laws.
CO2: Explain material requirement planning and store keeping procedure.
CO3: Plot and analyze inventory control models and techniques.
CO4: Prepare and analyze CPM and PERT for given activities.
CO5: List and explain PPC functions.

Department	CSE
Course Code	PEC-IT501A
Title of the Course	Theory of Computation
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	35
Course Outcomes	CO1: Define a system and recognize the behavior of a system. They will be able to minimize a system and compare different systems. CO2: Convert Finite Automata to regular expression. Students will be able to check equivalence between regularlinear grammar and FA. CO3: Minimize context free grammar. Student will be able to check equivalence of CFL and PDA. CO4: They Will be able to design Turing Machine. CO5: Design Turing machine.

Department	CSE
Course Code	PEC-IT501B
Title of the Course	Artificial Intelligence
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	34
Course Outcomes	CO1: To indicate the limitation of conventional computational approaches and the advantage of Artificial Intelligence in complex real life problem solving. CO2: To discuss on the strategies for various shortest path problems, optimization problems, machine

	learning problems and various well known gaming problems like chess, missionaries and cannibal problems, tick-tack-toe problems, etc.
	CO3: To illustrate the functionalities and working model of various high end AI systems like robotics, expert systems, etc.
	CO4: To recognize the limitation of AI in contributing in the roadmap of future strategically development in various AI related fields.

Department	CSE
Course Code	PEC-IT501C
Title of the Course	Advanced Computer Architecture
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	39
Course Outcomes	**CO1:** To distinguish the concepts of Computer Architecture and Organization.
	CO2: To illustrate various Parallel Processing Architectures, Data and Resource Dependencies, Program Partitioning and Scheduling, Control Flow vs. Data Flow.
	CO3: To discuss on the Network topologies, RISC vs. CISC, Memory Hierarchy, and Virtual Memory.
	CO4: To elaborate the concepts of Pipelining, Instruction Pipelining, dynamic pipelining, and arithmetic pipelines.
	CO5: To indicate multiprocessors, vector and array processing principles.
	CO6: To recognize Data Flow Architecture and Parallel Programming Models, Languages, Compilers.

Department	CSE
Course Code	PEC-IT501D
Title of the Course	Computer Graphics
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	40

Course Outcomes	CO1: To elaborate the representation of graphics in the form of picture elements or picture coordinates in computers.
	CO2: To illustrate how graphics are created and updated with the help of some preliminary algorithms.
	CO3: To explain the concept of image transformation and translation to satisfy some image related problems.
	CO4: To discuss on the basics of 2d and 3d transformations and their underlying relations.
	CO5: To enlighten on the approaches towards overcoming the limitations of basic drawing algorithms, translation and transformation techniques.

Department	CSE
Course Code	MC-CS 501
Title of the Course	Constitution of India
Nature of Course	LECTURE
Type of Course	COMPULSORY
Contact Hours	3L
Total Contact Hours	23
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Union Government and its Administration .

CO2: Know the structure of the Indian Union: Federalism, Centre- State relationship

CO3: Analyze Local Administration District's Administration head.

CO4: Describe role of Election Commission Election Commission. |

Department	CSE
Course Code	PCC-CS591
Title of the Course	Compiler Design Lab
Nature of Course	PRACTICAL

Type of Course	COMPULSORY
Contact Hours	4P
Total Contact Hours	32
Course Outcomes	CO1: Be exposed to compiler writing tools. CO2: Learn to implement the different Phases of compiler CO3: Be familiar with control flow and data flow analysis CO4: Learn simple optimization techniques

Department	CSE
Course Code	PCC-CS592
Title of the Course	Operating System Lab
Nature of Course	PRACTICAL
Type of Course	COMPULSORY
Contact Hours	4P
Total Contact Hours	32
Course Outcomes	**CO1:** To operate on UNIX / Linux operating system with various shell commands, including different kernel level activities. **CO2:** To handle and synchronize processes and threads, with and without interrupts. **CO3:** To employ the concept of pipes for improving the efficiency of an operating system in terms of speed up and throughput.

Department	CSE
Course Code	PCC-CS593
Title of the Course	Object Oriented Programming Lab
Nature of Course	PRACTICAL
Type of Course	COMPULSORY
Contact Hours	4P
Total Contact Hours	32
Course Outcomes	**CO1:** To write and execute Object Oriented Programs to solve simple engineering problems. **CO2:** To developing programs using interfaces, polymorphism etc. **CO3:** To conduct experiments on multi-threaded programming, event-driven and concurrent programming.

6TH SEM

Department	CSE
Course Code	PCC-CS601
Title of the Course	Database Management Systems
Nature of Course	LECTURE
Type of Course	COMPULSORY
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	CO1: For a given query write relational algebra expressions for that query and optimize the developedexpressions CO2: For a given specification of the requirement design the databases using E R method andnormalization. CO3: For a given specification construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, andDB2. CO4: For a given query optimize its execution using Query optimizationalgorithms CO5: For a given transaction-processing system, determine the transaction atomicity, consistency, isolation, anddurability. CO6: Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.

Department	CSE
Course Code	PCC-CS602
Title of the Course	Computer Networks
Nature of Course	LECTURE
Type of Course	COMPULSORY
Contact Hours	3L
Total Contact Hours	47
Course Outcomes	CO1: Understand research problem formulation. CO2: Analyze research related information CO3: Follow research ethics CO4: Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity. CO5: Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular. CO6: Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

Department	CSE
Course Code	PEC-IT601A
Title of the Course	Advanced Algorithms
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	48
Course Outcomes	CO1: Analyze the complexity/performance of different algorithms. CO2: Determine the appropriate data structure for solving a particular set of problems. CO3: Categorize the different problems in various classes according to their complexity. CO4: Students should have an insight of recent activities in the field of the advanced data structure.

Department	CSE
Course Code	PEC-IT601B
Title of the Course	Distributed Systems
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	48
Course Outcomes	CO1: Design trends in distributed systems. CO2: Apply network virtualization. CO3: Apply remote method invocation and objects.

Department	CSE
Course Code	PEC-IT601C
Title of the Course	Software Engineering
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	44
Course Outcomes	**CO1:** To illustrate different phases of developing high-end software in an industry. **CO2:** To recognize different techniques of software testing, reusability of software and software maintenance. **CO3:** To identify different challenges in maintaining or updating old software. **CO4:** To justify the strategies for testing, reusability etc. to reduce cost of development and / or maintenance. **CO5:** To demonstrate the role and

	responsibilities of software engineers in various phases of software development.

Department	CSE
Course Code	PEC-IT601D
Title of the Course	Image Processing
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	44
Course Outcomes	**CO1:** To discuss on the basics of digital image processing and digital image formation. **CO2:** To illustrate different mathematical preliminaries to deal with digital image processing. **CO3:** To explain the concept of Image restoration and image segmentation.

Department	CSE
Course Code	PEC-IT602A
Title of the Course	Parallel and Distributed Algorithms
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	44
Course Outcomes	**CO1:** To discuss on the parallel computing and its various aspects. **CO2:** To recognize various parallel algorithms. **CO3:** To use of linear systems of equation and sorting. To illustrate various graph algorithms and Parallel Programming Languages.

Department	CSE
Course Code	PEC-IT602B
Title of the Course	Data Warehousing and Data Mining
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	49
Course Outcomes	CO1:Study of different sequential pattern algorithms CO 2:Study the technique to extract patterns from time series data and it application in real world.

	CO3: Can extend the Graph mining algorithms to Web mining CO4: Help in identifying the computing framework for Big Data

Department	CSE
Course Code	PEC-IT602C
Title of the Course	Human Computer Interaction
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	47
Course Outcomes	CO1: Differentiate between various software vulnerabilities. CO2: Software process vulnerabilities for an organization. CO3: Monitor resources consumption in a software. CO4: Interrelate security and software development process.

Department	CSE
Course Code	PEC-IT602D
Title of the Course	Pattern Recognition
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	40
Course Outcomes	**CO1:** To explain the concept of pattern recognition and its different phases. **CO2:** To discuss on the idea of feature extraction and different approaches towards prototype selection. **CO3:** To illustrate the Support Vector Machine and its application in real life problem solving.

Department	CSE
Course Code	OEC-IT601A
Title of the Course	Numerical Methods
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	26
Course Outcomes	CO1: Ability to understand numerical computation & Interpolation. CO2: Ability to learn Numerical integration & solution of linear equations.

	CO3: Ability to solve Numerical solution of Algebraic & differential equation.

Department	CSE
Course Code	OEC-IT601B
Title of the Course	Human Resource Development and Organizational Behavior
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	24
Course Outcomes	**CO1:** To illustrate the roles and functions of the HR. **CO2:** To discuss on different HR planning strategies. **CO3:** To indicate the importance of training and development and performance management system.

Department	CSE
Course Code	PCC-CS691
Title of the Course	Database Management System Lab
Nature of Course	PRACTICAL
Type of Course	COMPULSORY
Contact Hours	4P
Total Contact Hours	32
Course Outcomes	**CO1:** To create database, perform basic operation like insertion, deletion, and updation. **CO2:** To retrieve data from the database through query languages like SQL. **CO3:** To configure a database at the background of a high level program using front end tools and forms.

Department	CSE
Course Code	PCC-CS692
Title of the Course	Computer Networks Lab
Nature of Course	PRACTICAL
Type of Course	COMPULSORY
Contact Hours	4P
Total Contact Hours	32
Course Outcomes	**CO1:** To write socket programming for UDP, TCP and sliding window protocols. **CO2:** To conduct experiments on simulators for MAC and routing protocols.

	CO3: To implement data link layer flow control and error control mechanisms.

Department	CSE
Course Code	PROJ-CS681
Title of the Course	Project I
Nature of Course	PRACTICAL
Type of Course	COMPULSORY
Contact Hours	6P
Total Contact Hours	1 SEM
Course Outcomes	**CO1:** To conduct survey on the work done in the chosen domain. **CO2:** To formulate the problem out of the survey. **CO3:** To propose some technique towards the solution of the problem defined.

7TH SEM

Department	CSE
Course Code	PEC-CS701A
Title of the Course	Quantum Computing
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	37
Course Outcomes	CO1:knowledge of Vector spaces CO2:Matrices, Quantum state CO3:Density operator and Quantum

Department	CSE
Course Code	PEC-CS701B
Title of the Course	Cloud Computing
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	**CO1:** To explain the basics of cloud computing and its architecture. **CO2:** To illustrate the use of different platforms in cloud computing. **CO3:** To elaborate the infrastructure and cloud security. **CO4:** To explain the basic concepts of services and applications.

Department	CSE
Course Code	PEC-CS701C
Title of the Course	Digital Signal Processing
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	40
Course Outcomes	**CO1:** To discuss about discrete time signals and LTI systems.
	CO2: To illustrate the application of Z-transform, Discrete Fourier transforms and fast Fourier Transform.
	CO3: To indicate the design and implementation of filters.
	CO4: To generalize Digital Signal Processors and differentiate between ASIC and FPGA.

Department	CSE
Course Code	PEC-CS701D
Title of the Course	Multi-agent Intelligent Systems
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	33
Course Outcomes	CO1: To compare different application areas for agent systems.
	CO2: To build intelligent systems.
	CO3: To classify multi-agent interactions.

Department	CSE
Course Code	PEC-CS701E
Title of the Course	Machine Learning
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	46
Course Outcomes	CO1: To learn the concept of how to learn patterns and concepts from data without being explicitly programmed
	CO2: To design and analyse various machine

learning algorithms and techniques with a modern outlook focusing on recent advances.

CO3: Explore supervised and unsupervised learning paradigms of machine learning.

Department	CSE
Course Code	PEC-CS702A
Title of the Course	Neural Networks and Deep Learning
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	CO1: a) Define, b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Neural network.
	CO2: Develop the skills to gain a basic understanding of neural network theory .
	CO3: a) Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic Neural network.
	CO4: a) Compare and contrast in details between the fundamental concepts of Text, Audio, Image and Video and thereafter b) describe an overview level interconnected map of concepts/terminologies of Neural network and deep learning.

Department	CSE
Course Code	PEC-CS702B
Title of the Course	Soft Computing
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	42

Course Outcomes	**CO1:** To explain the fuzzy sets, fuzzy logic systems and its various applications in real life problem solving.
	CO2: To illustrate the concept of Artificial Neural Network and its applications.
	CO3: To discuss on the concept of Genetic Algorithm and its various applications.
	CO4: To elaborate the basics of Simulated Annealing, Tabu search, Ant colony optimization (ACO), Particle Swarm Optimization (PSO).

Department	CSE
Course Code	PEC-CS702C
Title of the Course	Adhoc –Sensor Network
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	32
Course Outcomes	CO1: To distinguish between different types of wireless networks.
	CO2: To classify different architectures.
	CO3: To compare between different communication protocols.
	CO4: To identify the requirements for establishing infrastructure.
	CO5: To identify various sensor network platforms and tools.

Department	CSE
Course Code	PEC-CS702D
Title of the Course	Information Theory and Coding
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	45
Course Outcomes	**CO1:** To illustrate the basic concepts of source encoding and channel encoding.
	CO2: To explain the basic concepts of coding for error detection and correction.
	CO3: To elaborate the cyclic, BCH and convolution codes.

Department	CSE
Course Code	PEC-CS702E
Title of the Course	Cyber Security
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	**CO1:** To indicate the basics of cybercrime and its various categories. **CO2:** To discuss about cybercrime in mobile and wireless devices. **CO3:** To illustrate different tools and methods used in cybercrime. **CO4:** To elaborate the concepts of phishing and identity theft, cybercrime and cyber security.

Department	CSE
Course Code	OEC-CS701A
Title of the Course	Operation Research
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	CO1: To solve different linear programming problems (LPP). CO2: To discuss on the Network Analysis and Inventory control. CO3: To Familiarize the Game Theory and Queuing Theory.

Department	CSE
Course Code	OEC-CS701B
Title of the Course	Multimedia Technology
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	45
Course Outcomes	**CO1:** To discuss on various aspects of multimedia technology and its application. **CO2:** To demonstrate different multimedia applications developed using Text, Audio, Image and Video. **CO3:** To illustrate different multimedia storage models and access techniques. **CO4:** To explain the basics of image and video databases.

Department	CSE
Course Code	OEC-CS701C
Title of the Course	Introduction to Philosophical Thoughts
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	CO1: a) Define , b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts ofCarvaka school. CO2: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts ofBuddhism. CO3: Analyse nature of Indian philosophy.

Department	CSE
Course Code	HSMC 701
Title of the Course	Project Management and Entrepreneurship
Nature of Course	LECTURE
Type of Course	COMPULSORY
Contact Hours	2L+1T
Total Contact Hours	40
Course Outcomes	**CO1:** To analyze various concepts project management, project planning and project scheduling. **CO2:** To implement the concept of Time Cost Trade-off Analysis, Resource Allocation and Levelling. **CO3:** To familiarize with project life cycle, project cost and project quality management. **CO4:** To explain the overview of Software Project Characteristics and Management and IT in projects.

Department	CSE
Course Code	PROJ-CS781
Title of the Course	Project II
Nature of Course	PRACTICAL
Type of Course	COMPULSORY
Contact Hours	12P
Total Contact Hours	

Course Outcomes	**CO4:** To conduct survey on the work done in the chosen domain.
	CO5: To formulate the problem out of the survey.
	CO6: To propose some technique towards the solution of the problem defined.

8TH SEM

Department	CSE
Course Code	PEC-CS801A
Title of the Course	Signal and Networks
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	38
Course Outcomes	CO1: Analyze design and implement combinational logic circuits.
	CO2: Develop a digital logic and apply it to solve real life problems.
	CO3: Simulate and implement combinational and sequential circuits

Department	CSE
Course Code	PEC-CS801B
Title of the Course	Cryptography and Network Security
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	38
Course Outcomes	**CO1:** To discuss on various types of attacks and their characteristics.
	CO2: To illustrate the basic concept of encryption and decryption for secure data transmission.
	CO3: To Analyze and compare various cryptography techniques.
	CO4: To explain the concept of digital

	signature and its applications.
	CO5: Proposing new strategies to secure data communication.

Department	CSE
Course Code	PEC-CS801C
Title of the Course	Natural Language Processing
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	**CO1:** To recognize the basics of Regular Expressions and Automata.
	CO2: To explain the concept of tokenization, morphology, language modeling, Hidden Markov Models and POS Tagging.
	CO3: To discuss on the text classification and context free grammar.
	CO4: Computational Lexical Semantics and Information Retrieval.

Department	CSE
Course Code	PEC-CS801D
Title of the Course	Web and Internet Technology
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	34
Course Outcomes	**CO1:** To illustrate the basics of Internet technology and related concepts like WWW, Internet, Intranet, etc.
	CO2: To explain the concept of Email in relation with some application layer protocols like SMTP, POP etc.
	CO3: To indicate different threats in the internet and relate strategies to overcome those threats.
	CO4: To create web pages using HTML, Javascript etc.
	CO5: To explain the basic concepts of search engine, internet telephony etc.

Department	CSE
Course Code	PEC-CS801E
Title of the Course	Internet of Things
Nature of Course	LECTURE

Type of Course	Elective
Contact Hours	3L
Total Contact Hours	48
Course Outcomes	CO1:Understand the vision of IoT from a global context. CO2:Determine the Market perspective of IoT. CO3:Use of Devices, Gateways and Data Management in IoT. CO4: Application of IoT in Industrial and Commercial Building Automation and Real World Design Constraints. CO5:Building state of the art architecture in IoT.

Department	CSE
Course Code	OEC-CS801A
Title of the Course	Big Data Analytics
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	48
Course Outcomes	CO1:Describe big data and use cases from selected business Explain NoSQL big data management domains CO2: Install, configure, and run Hadoop and HDFS CO3:Perform map-reduce analytics using Hadoop Co4:Use Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics

Department	CSE
Course Code	OEC-CS801B
Title of the Course	Cyber Law and Ethics
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	32
Course Outcomes	**CO5:** To indicate the basics of cybercrime and its various categories. **CO6:** To discuss about cybercrime in mobile and wireless devices. **CO7:** To illustrate different tools and methods used in cybercrime. **CO8:** To elaborate the concepts of phishing and identity theft, cybercrime and cyber security.

Department	CSE

Course Code	OEC-CS801C
Title of the Course	Mobile Computing
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	39
Course Outcomes	**CO1:** To design and implement mobile applications to realize location-aware computing. **CO2:** To administrate and maintain a wireless LAN. **CO3:** To design algorithms for location estimation based on different routing techniques. **CO4:** To develop mobile computing applications by analyzing their properties and requirements, selecting the appropriate computing models and software architectures, and applying standard programming languages and tools.

Department	CSE
Course Code	OEC-IT801D
Title of the Course	Robotics
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	40
Course Outcomes	**CO1:** To illustrate the basics of robotics, its components and various applications. **CO2:** To discuss about kinematics of serial and parallel robots. **CO3:** To elaborate velocity and static analysis of robot manipulators, Dynamics of serial and parallel manipulators. **CO4:** To explain the concept of motion planning and control, Modelling and control of flexible robots, Modelling and analysis of wheeled mobile robots.

Department	CSE
Course Code	OEC-CS801E
Title of the Course	Soft Skill & Interpersonal Communication
Nature of Course	LECTURE
Type of Course	Elective

Contact Hours	3L
Total Contact Hours	40
Course Outcomes	CO1: a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts ofSelf-Discovery. CO2:Interpersonal Communication improvement. CO3: Analyse Soft Skills.

Department	CSE
Course Code	OEC-CS802A
Title of the Course	E-Commerce & ERP
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	39
Course Outcomes	**CO1:** To elaborate the basics of e-commerce and its various applications. **CO2:** To illustrate the concepts of business to business e-commerce and its various aspects. **CO3:** To discuss about various legal and security issues. **CO4:** To elaborate the idea of e-business.

Department	CSE
Course Code	OEC-CS802B
Title of the Course	Micro-electronics and VLSI Design
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	39
Course Outcomes	**CO1:** To explain the basics of VLSI design with its features. **CO2:** To illustrate the structure of MOS and its application in VLSI design. **CO3:** To elaborate various micro-electronic processes for VLSI fabrication. **CO4:** To indicate the use of Hardware Description Language for various digital circuit designs.

Department	CSE
Course Code	OEC-CS802C

Title of the Course	Economic Policies in India
Nature of Course	LECTURE
Type of Course	Elective
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	CO1: Define, explain in detail and Issues in growth, development, and sustainability, Population and economic development, Factors in development, critical evaluation of growth, inequality, poverty and competitiveness, pre- and post- reform eras, Macroeconomic policies and their impact: fiscal policy, financial and monetary policies, policies and performance; production and productivity; credit; labour markets and pricing; land reforms; regional variations, production trends,small scale industries; public sector; foreign investment, labour regulation, trends and performance, trade and investment policy.

CO2: Can define and understand government policies and will enable informed participation in economic decision making, thus improving their employment prospects and career advancement.

CO3: Analyze current economic policy thus improving their chances of getting employed, and be more effective, in positions of responsibility and decision making.

CO4: Differentiate and compare between fiscal policy,financial and monetary policies , policies and performance; production and productivity; credit; labour markets and pricing; land reforms; regional variations

CO5: Be able to devise a given problem into independent modules and then to solve by integrating the modules by providing appropriate interfaces.
CO6 Identify unsolved but necessary real world problems of Economic policies of India and thereafter generate detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems in Economic policies of   India.
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Department	CSE
Course Code	PROJ-CS881
Title of the Course	Project III
Nature of Course	PRACTICAL
Type of Course	COMPULSORY
Contact Hours	12P
Total Contact Hours	1 SEM
Course Outcomes	**CO1:** To apply advanced programming techniques in identified real world problems. **CO2:** To analyze the utilies of solutions. **CO3:** To carry out technical report/thesis writing.