MEENAKSHI COLLEGE OF ENGINEERING

No-12,Vembuli Amman Koil Street, West K.K. Nagar,
Chennai – 78

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

REGULATION-2021

COURSE OUTCOMES

SEMESTER I

Course Name : HS3152 - PROFESSIONAL ENGLISH - I

CO1	To use appropriate words in a professional context
CO2	To gain understanding of basic grammatic structures and use them in right context.
CO3	To read and infer the denotative and connotative meanings of technical texts
CO4	To write definitions, descriptions, narrations and essays on various topics

Course Name : MA3151 - MATRICES AND CALCULUS

CO1	Use the matrix algebra methods for solving practical problems
CO2	Apply differential calculus tools in solving various application problems.
CO3	Able to use differential calculus ideas on several variable functions.
CO4	Apply different methods of integration in solving practical problems.
CO5	Apply multiple integral ideas in solving areas, volumes and other practical problems

Course Name :PH3151 - ENGINEERING PHYSICS

CO1	Understand the importance of mechanics.
CO2	Express their knowledge in electromagnetic waves
CO3	Demonstrate a strong foundational knowledge in oscillations, optics and lasers.
CO4	Understand the importance of quantum physics.
CO5	Comprehend and apply quantum mechanical principles towards the formation of energy bands.

Course Name:CY3151- ENGINEERING CHEMISTRY

CO1	To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water
CO2	To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
CO3	To apply the knowledge of phase rule and composites for material selection requirements.
CO4	To recommend suitable fuels for engineering processes and applications.
CO5	To recognize different forms of energy resources and apply them for suitable applications in energy sectors.

Course Name :GE3151 - PROBLEM SOLVING AND PYTHON PROGRAMMING

CO1	Develop algorithmic solutions to simple computational problems.
CO2	Develop and execute simple Python programs.
CO3	Write simple Python programs using conditionals and loops for solving problems.
CO4	Decompose a Python program into functions.
CO5	Represent compound data using Python lists, tuples, dictionaries etc.
CO6	Read and write data from/to files in Python programs.

Course Name: GE3152 **-** HERITAGE TAMILS

CO1	Discuss the Tamil Language and Literature
CO2	Discuss about the paintings modern Art Sculpture
CO3	Illustrate the folk martial arts
CO4	Understand the Sangam age through Tamil Literature
CO5	Discuss the contribution of Tamil Literature in Indian Civilization

Course Name :GE3171 - PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY

CO1	Develop algorithmic solutions to simple computational problems
CO2	Develop and execute simple Python programs.
CO3	Implement programs in Python using conditionals and loops for solving problems.
CO4	Deploy functions to decompose a Python program.
CO5	Process compound data using Python data structures.
CO6	Utilize Python packages in developing software applications.

Course Name :BS3171- PHYSICS AND CHEMISTRY LABORATORY

CO1	Understand the functioning of various physics laboratory equipment.
CO2	Use graphical models to analyze laboratory data.
CO3	Use mathematical models as a medium for quantitative reasoning and describing physical reality.
CO4	Access, process and analyze scientific information.
CO5	Solve problems individually and collaboratively.

Course Name :GE3172 - ENGLISH LABORATORY

CO1	To listen to and comprehend general as well as complex academic information
CO2	To listen to and understand different points of view in a discussion
CO3	To speak fluently and accurately in formal and informal communicative contexts
CO4	To describe products and processes and explain their uses and purposes clearly and accurately
CO5	To express their opinions effectively in both formal and informal discussions

SEMESTER II

Course Name :HS3252 - PROFESSIONAL ENGLISH - II

CO1	To compare and contrast products and ideas in technical texts.
CO2	To identify and report cause and effects in events, industrial processes through technical texts
CO3	To analyse problems in order to arrive at feasible solutions and communicate them in the written format.
CO4	To present their ideas and opinions in a planned and logical manner
CO5	To draft effective resumes in the context of job search.

Course Name :MA3251 - STATISTICS AND NUMERICAL METHODS

CO1	Apply the concept of testing of hypothesis for small and large samples in real life problems
CO2	Apply the basic concepts of classifications of design of experiments in the field of agriculture.
CO3	Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.
CO4	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
CO5	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

Course Name :PH3256- PHYSICS FOR INFORMATION SCIENCE

CO1	gain knowledge on classical and quantum electron theories, and energy band structures
CO2	acquire knowledge on basics of semiconductor physics and its applications in various devices
CO3	get knowledge on magnetic properties of materials and their applications in data storage
CO4	have the necessary understanding on the functioning of optical materials for optoelectronics
CO5	understand the basics of quantum structures and their applications and basics of quantum computing

Course Name :BE3251 - BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

CO1	Compute the electric circuit parameters for simple problems
CO2	Explain the working principle and applications of electrical machines
CO3	Analyze the characteristics of analog electronic devices
CO4	Explain the basic concepts of digital electronics
CO5	Explain the operating principles of measuring instruments

Course Name :GE3251 - ENGINEERING GRAPHICS

CO1	Use BIS conventions and specifications for engineering drawing.
CO2	Construct the conic curves, involutes and cycloid.
CO3	Solve practical problems involving projection of lines.
CO4	Draw the orthographic, isometric and perspective projections of simple solids.
CO5	Draw the development of simple solids.

Course Name :CS3251 - PROGRAMMING IN C

CO1	Demonstrate knowledge on C Programming constructs
CO2	Develop simple applications in C using basic constructs
CO3	Design and implement applications using arrays and strings
CO4	Develop and implement modular applications in C using functions.
CO5	Develop applications in C using structures and pointers.
CO6	Design applications using sequential and random access file processing.

Course Name: GE3252- TAMILS AND TECHNOLOGY

CO1	Learn about weaving and ceramic methods in Sangam period
CO2	Experience about art and sculpture in Sangam period
CO3	Make and use of metals in Sangam period
CO4	Apply the knowledge on water management in Sangam Period
CO5	Implementing the digitization in Tamil

Course Name :GE3271 - ENGINEERING PRACTICES LABORATORY

CO1	Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.
CO2	Wire various electrical joints in common household electrical wire work.
CO3	Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.
CO4	Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

Course Name :CS3271 - PROGRAMMING IN C LABORATORY

CO1	Demonstrate knowledge on C programming constructs.
CO2	Develop programs in C using basic constructs.
CO3	Develop programs in C using arrays.
CO4	Develop applications in C using strings, pointers, functions
CO5	Develop applications in C using structures.
CO6	Develop applications in C using file processing.

Course Name :GE3272 - COMMUNICATION LABORATORY / FOREIGNLANGUAGE

CO1	Speak effectively in group discussions held in a formal/semi formal contexts.
CO2	Discuss, analyse and present concepts and problems from various perspectives to arrive at suitable solutions
CO3	Write emails, letters and effective job applications.
CO4	Write critical reports to convey data and information with clarity and precision
CO5	Give appropriate instructions and recommendations for safe execution of tasks

SEMESTER III

Course Name :MA3354 - DISCRETE MATHEMATICS

CO1	Have knowledge of the concepts needed to test the logic of a program.
CO2	Have an understanding in identifying structures on many levels.
CO3	Be aware of a class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.
CO4	Be aware of the counting principles.
CO5	Be exposed to concepts and properties of algebraic structures such as groups, rings and fields.

Course Name :CS3351 - DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION

CO1	Design various combinational digital circuits using logic gates
CO2	Design sequential circuits and analyze the design procedures
CO3	State the fundamentals of computer systems and analyze the execution of an instruction
CO4	Analyze different types of control design and identify hazards
CO5	Identify the characteristics of various memory systems and I/O communication

Course Name :CS3352 - FOUNDATIONS OF DATA SCIENCE

CO1	Define the data science process
CO2	Understand different types of data description for data science process
CO3	Gain knowledge on relationships between data
CO4	Use the Python Libraries for Data Wrangling
CO5	Apply visualization Libraries in Python to interpret and explore data

Course Name :CD3291 - DATA STRUCTURES AND ALGORITHMS

CO1	Explain abstract data types
CO2	Design, implement, and analyze linear data structures, such as lists, queues, and stacks, according to the needs of different applications
CO3	Design, implement, and analyze efficient tree structures to meet requirements such as searching, indexing, and sorting
CO4	Model problems as graph problems and implement efficient graph algorithms to solve them.

Course Name :CS3391 - OBJECT ORIENTED PROGRAMMING

CO1	Apply the concepts of classes and objects to solve simple problems
CO2	Develop programs using inheritance, packages and interfaces
CO3	Make use of exception handling mechanisms and multithreaded model to solve real world problems
CO4	Build Java applications with I/O packages, string classes, Collections and generics concepts
CO5	Integrate the concepts of event handling and JavaFX components and controls for developing GUI based applications

Course Name :CD3281 - DATA STRUCTURES AND ALGORITHMS LABORATORY

CO1	Implement ADTs as Python classes
CO2	Design, implement, and analyse linear data structures, such as lists, queues, and stacks, according to the needs of different applications
CO3	Design, implement, and analyse efficient tree structures to meet requirements such as searching, indexing, and sorting
CO4	Model problems as graph problems and implement efficient graph algorithms to solve them

Course Name :CS3381- OBJECT ORIENTED PROGRAMMING LABORATORY

CO1	Design and develop java programs using object oriented programming concepts
CO2	Develop simple applications using object oriented concepts such as package, exceptions
CO3	Create GUIs and event driven programming applications for real world problems
CO4	Implement multithreading, and generics concepts
CO5	Implement and deploy web applications using Java

Course Name:CS3361 - DATA SCIENCE LABORATORY

CO1	Make use of the python libraries for data science
CO2	Make use of the basic Statistical and Probability measures for data science.
CO3	Perform descriptive analytics on the benchmark data sets.
CO4	Perform correlation and regression analytics on standard data sets
CO5	Present and interpret data using visualization packages in Python.

Course Name :GE3361 - PROFESSIONAL DEVELOPMENT

CO1	Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements
CO2	Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding
CO3	Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects.

SEMESTER IV

Course Name :CS3452 - THEORY OF COMPUTATION

CO1	Construct automata theory using Finite Automata
CO2	Write regular expressions for any pattern
CO3	Design context free grammar and Pushdown Automata
CO4	Design Turing machine for computational functions
CO5	Differentiate between decidable and undecidable problems

Course Name :AL3452 - OPERATING SYSTEMS

CO1	Analyze various scheduling algorithms and process synchronization.
CO2	Explain deadlock, prevention and avoidance algorithms.
CO3	Compare and contrast various memory management schemes.
CO4	Explain the functionality of file systems I/O systems, and Virtualization
CO5	Compare iOS and Android Operating Systems.

Course Name :AD3391 - DATABASE DESIGN AND MANAGEMENT

CO1	Understand the database development life cycle and apply conceptual modeling
CO2	Apply SQL and programming in SQL to create, manipulate and query the database
CO3	Apply the conceptual-to-relational mapping and normalization to design relational database
CO4	Determine the serializability of any non-serial schedule using concurrency techniques
CO5	Apply the data model and querying in Object-relational and No-SQL databases.

Course Name:AL3451 - MACHINE LEARNING

CO1	Explain the basic concepts of machine learning.
CO2	Construct supervised learning models.
CO3	Construct unsupervised learning algorithms.
CO4	Evaluate and compare different models

Course Name :AL3391- ARTIFICIAL INTELLIGENCE

CO1	Explain intelligent agent frameworks
CO2	Apply problem solving techniques
CO3	Apply game playing and CSP techniques
CO4	Perform logical reasoning
CO5	Perform probabilistic reasoning under uncertainty

Course Name :GE3451 - ENVIRONMENTAL SCIENCES AND SUSTAINABILITY

CO1	To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.
CO2	To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.
CO3	To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.
CO4	To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.

CO5	To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.

Course Name :AL3411 - ARTIFICIAL INTELLIGENCE & MACHINE LEARNING LABORATORY

CO1	Implement uninformed and informed search techniques
CO2	Build a knowledge base in Prolog and process queries to perform inference
CO3	Develop supervised learning models
CO4	Develop regression models
CO5	Compare and evaluate the performance of different models

Course Name :AD3381- DATABASE DESIGN AND MANAGEMENT LABORATORY

CO1	Understand the database development life cycle
CO2	Design relational database using conceptual-to-relational mapping, Normalization
CO3	Apply SQL for creation, manipulation and retrieval of data
CO4	Develop a database applications for real-time problems
CO5	Design and query object-relational databases

SEMESTER V

Course Name :AL3501- NATURAL LANGUAGE PROCESSING

CO1	Tag a given text with basic Language features
CO2	Implement a rule based system to tackle morphology/syntax of a language
CO3	Design a tag set to be used for statistical processing for real-timeapplications.
CO4	Compare and contrast the use of different statistical approaches for different types of NLP applications.

Course Name :AL3502 - DEEP LEARNING FOR VISION

CO1	Implement basic Image processing operations
CO2	Understand the basic concept of deep learning
CO3	Design and implement CNN and RNN and Deep generative model
CO4	Understand the role of deep learning in computer vision applications.
CO5	Design and implement Deep generative model

Course Name :CB3491 - CRYPTOGRAPHY AND CYBER SECURITY

CO1	Understand the fundamentals of networks security, security architecture, threats and vulnerabilities
CO2	Apply the different cryptographic operations of symmetric cryptographic algorithms
CO3	Apply the different cryptographic operations of public key cryptography
CO4	Apply the various Authentication schemes to simulate different applications.
CO5	Understand various cyber crimes and cyber security.

Course Name :CS3551 - DISTRIBUTED COMPUTING

CO1	Explain the foundations of distributed systems (K2)
CO2	Solve synchronization and state consistency problems (K3)
CO3	Use resource sharing techniques in distributed systems (K3)
CO4	Apply working model of consensus and reliability of distributed systems (K3)
CO5	Explain the fundamentals of cloud computing (K2)

SEMESTER VI

Course Name :CCS356 - OBJECT ORIENTED SOFTWARE ENGINEERING

CO1	Compare various Software Development Lifecycle Models
CO2	Evaluate project management approaches as well as cost and schedule estimation strategies.
CO3	Perform formal analysis on specifications
CO4	Use UML diagrams for analysis and design.
CO5	Architect and design using architectural styles and design patterns, and test the system

Course Name :CS3691 - EMBEDDED SYSTEMS AND IOT

CO1	Explain the architecture of embedded processors.
CO2	Write embedded C programs
CO3	Design simple embedded applications.
CO4	Compare the communication models in IOT
CO5	Design IoT applications using Arduino/Raspberry Pi /open platform.

SEMESTER VII/VIII*

Course Name :GE3791 - HUMAN VALUES AND ETHICS

CO1	Identify the importance of democratic, secular and scientific values in harmonious functioning of social life
CO2	Practice democratic and scientific values in both their personal and professional life.
CO3	Find rational solutions to social problems.
CO4	Behave in an ethical manner in society
CO5	Practice critical thinking and the pursuit of truth.

Course Name :AL3711 - SUMMER INTERNSHIP

CO1	Industry Practices, Processes,Techniques, technology, automation and other core aspects of software industry
CO2	Analyze, Design solutions to complex business problems
CO3	Build and deploy solutions for target platform
CO4	Preparation of Technical reports and presentation

SEMESTER VIII/VII*

Course Name :AL3811 - PROJECT WORK/INTERNSHIP

CO1	Gain Domain knowledge and technical skill set required for solving industry / research problems
CO2	Provide solution architecture, module level designs, algorithms
CO3	Implement, test and deploy the solution for the target platform
CO4	Prepare detailed technical report, demonstrate and present the work