"Empowerment through quality technical education"
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Department of AI and DS Engineering

SECOND YEAR (2020 COURSE) COURSE OUTCOMES

Course Code with Course Name

Course Outcomes of Second Year Engineering Course

Semester	Class	Course Name	Course Code	Subject Code	Statement
Semester-I	SE	Discrete Mathematics	C201	210241.1	**Formulate** problems precisely, solve the problems, apply formal proof techniques, and explain the reasoning clearly
				210241.2	**Apply** appropriate mathematical concepts and skills to solve problems in both familiar and unfamiliar situations including those in real-life contexts
				210241.3	**Design and analyze** real world engineering problems by applying set theory, propositional logic and to construct proofs using mathematical induction
				210241.4	**Specify, manipulate and apply** equivalence relations; construct and use functions and apply these concepts to solve new problems
				210241.5	**Calculate** numbers of possible outcomes using permutations and combinations; to model and analyze computational processes using combinatorics.
				210241.6	**Model and solve** computing problem using tree and graph and solve problems using appropriate algorithms
				210241.7	**Analyze** the properties of binary operations, apply abstract algebra in coding theory and evaluate the algebraic structures
Semester-I	SE	Fundamentals of Data Structures	C202	210242.1	**Design** the algorithms to solve the programming problems, identify appropriate algorithmic strategy for specific application, and analyze the time and space complexity.
				210242.2	**Discriminate** the usage of various structures, **Design/Program/Implement** the appropriate data structures; use them in implementations of abstract data types and Identity the appropriate data structure in approaching the problem solution
				210242.3	**Demonstrate** use of sequential data structures- Array and Linked lists to store and process data.
				210242.4	**Understand** the computational efficiency of the principal algorithms for searching and sorting and choose the most efficient one for the application

				210242.5	**Compare and contrast** different implementations of data structures (dynamic and static).
				210242.6	**Understand, Implement and apply** principles of data structures-stack and queue to solve computational problems.
Semester-I	**SE**	**Object Oriented Programming**	**C203**	**210243.1**	**Apply** constructs- sequence, selection and iteration; classes and objects, inheritance, use ofpredefined classes from libraries while developing software
				210243.2	**Design** object-oriented solutions for small systems involving multiple objects.
				210243.3	**Use** virtual and pure virtual function and complex programming situations.
				210243.4	**Apply** object-oriented software principles in problem solving
				210243.5	**Analyze** the strengths of object-oriented programming
				210243.6	**Develop** the application using object oriented programming language (C++).
Semester-I	**SE**	**Computer Graphics**	**C204**	**210244.1**	**Identify** the basic terminologies of Computer Graphics and interpret the mathematicalfoundation of the concepts of computer graphics
				210244.2	**Apply** mathematics to develop Computer programs for elementary graphic operations
				210244.3	**Illustrate** the concepts of windowing and clipping and **apply** various algorithms to fill and clippolygons
				210244.4	**Understand** and **apply** the core concepts of computer graphics, including transformation intwo and three dimensions, viewing and projection
				210244.5	**Understand** the concepts of color models, lighting, shading models and hidden surfaceelimination.
				210244.6	**Create** effective programs using concepts of curves, fractals, animation and gaming.
Semester-I	**SE**	**Operating Systems**	**C205**	**217521.1**	**Enlist** functions of OS and types of system calls
				217521.2	**Apply** process scheduling algorithms to solve a given problem
				217521.3	**Illustrate** deadlock prevention, avoidance and recovery
				217521.4	**Explain** memory management technique
				217521.5	**Illustrate** I/O and file management policies
				217521.6	**Describe** Linux process management
Semester-II	**SE**	**Data Structures Laboratory**	**C206**	**217522.1**	**Use** algorithms on various linear data structure using sequential organization to solve real lifeproblems

				217522.2	**Analyze** problems to **apply** suitable searching and sorting algorithm to various applications
				217522.3	**Analyze** problems to **use variants of** linked list and solve various real life problems
				217522.4	Designing and implement data structures and algorithms for solving different kinds ofproblems.
Semester-I	**SE**	**OOP and Computer Graphics Laboratory**	**C207**	**217523.1**	U**nderstand** and **apply** the concepts like inheritance, polymorphism, exceptionhandling and generic structures for implementing reusable programming codes
				217523.2	**Analyze** the concept of file and **apply** it while storing and retrieving the data fromsecondary storages.
				217523.3	**Analyze** and **apply** computer graphics algorithms for line-circle drawing, scanconversion and filling with the help of object oriented programming concepts
				217523.4	**Understand** the concept of windowing and clipping and **apply** various algorithms tofill and clip polygons
				217523.5	**Apply** logic to implement, curves, fractals, animation and gaming programs
Semester-I	**SE**	**Operating System Laboratory**	**C208**	**217524.1**	Choose the best CPU scheduling algorithm for a given problem instance
				217524.2	Demonstrate interprocess communication
				217524.3	Apply deadlock avoidance algorithm
				217524.4	Compare performance of page replacement algorithms
				217524.5	Demonstrate the fundamental UNIX commands & system calls
Semester-I	**SE**	**Business Communication Skills**	**C209**	**217525.1**	**Express** effectively through verbal/oral communication and improve listening skills
				217525.2	**Write** precise briefs or reports and technical documents
				217525.3	**Prepare** for group discussion / meetings / interviews and presentations
				217525.4	**Explore** goal/target setting, self-motivation and practicing creative thinking
				217525.5	**Operate** effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadershipqualities
Semester-I	**SE**	**Humanity and Social Science**	**C210**	**217526.1**	**Aware** of the various issues concerning humans and society.
				217526.2	**Aware** about their responsibilities towards society.
				217526.3	Sensitized about broader issues regarding the social, cultural, economic and human aspects,involved in social changes

				217526.4	**Able** to understand the nature of the individual and the relationship between self and thecommunity
				217526.5	**Able** to understand major ideas, values, beliefs, and experiences that have shaped humanhistory and cultures
Semester-II	**SE**	**Statistics**	**C211**	**217528.1**	Identify the use of appropriate statistical terms to describe data
				217528..2	Use appropriate statistical methods to collect, organize, display, and analyze relevant data.
				217528..3	Use distribution functions for random variables
				217528..4	Distinguish between correlation coefficient and regression
				217528..5	Understand tests for hypothesis and its significance
Semester-II	**SE**	**Internet of Things**	**C212**	**217529.1**	Have a thorough understanding of the structure, function and characteristics of computer systems and Understand the structure of various number systems and its application in
				217529.2	Develop the skill set to build IoT systems and sensor interfacing.
				217529.3	Explain the concept of Internet of Things and identify the technologies that make up the internet of things
				217529.4	Analyze trade-offs in interconnected wireless embedded device networks. Select Appropriate Protocols for IoT Solutions
				217529.5	Design a simple IoT system comprising sensors by analyzing the requirements of IoT Application
				217529.6	Identify the Application of IoT in automation of Commercial and Real World examples
Semester-II	**SE**	**Data Structures and Algorithms**	**C213**	**210252.1**	**Identify and articulate** the complexity goals and benefits of a good hashing scheme for real- world applications.
				210252.2	**Apply** non-linear data structures for solving problems of various domain.
				210252.3	**Design and specify** the operations of a nonlinear-based abstract data type and implement them in a high-level programming language.
				210252.4	**Analyze** the algorithmic solutions for resource requirements and optimization
				210252.5	**Use** efficient indexing methods and multiway search techniques to store and maintain data.
				210252.6	U**se** appropriate modern tools to understand and analyze the functionalities confined to the secondary storage
ster-	**SE**	**Softw are Engi neeri**	**C214**	**210253.1**	**Analyze** software requirements and formulate design solution for a software.

				210253.2	**Design** applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns.
				210253.3	**Apply** new software models, techniques and technologies to bring out innovative and novelistic solutions for the growth of the society in all aspects and evolving into their continuous professional development.
				210253.4	**Model** and design User interface and component-level.
				210253.5	**Identify** and handle risk management and software configuration management.
				210253.6	**Utilize** knowledge of software testing approaches, approaches to verification and validation.
				210253.7	**Construct** software of high quality – software that is reliable, and that is reasonably easy to understand, modify and maintain efficient, reliable, robust and cost-effective software solutions
Semester-II	**SE**	**Management Information Systems**	**C215**	**217530.1**	**Explain** the concepts of Management Information System and Business intelligence for MIS.
				217530.2	**Illustrate** the need of information systems in global business and ethical issues.
				217530.3	**List** the IT infrastructure components and **explain** security in the Information System.
				217530.4	**Demonstrate** the importance of project management and **extend** its use in the international information system.
				217530.5	**Illustrate** the concepts of decision support systems for business applications.
				217530.6	**Relate** artificial intelligence and data science for Management Information System
Semester-II	**SE**	**Internet of Things Laboratory**	**C216**	**217531.1**	Understand IOT Application Development using Raspberry Pi/ Beagle board/ Arduino board
				217531.2	Develop and modify the code for various sensor based applications using wireless sensor modules and working with a variety of modules like environmental modules.
				217531.3	Make use of Cloud platform to upload and analyse any sensor data
Semester-II	**SE**	**Data Structures and Algorithms Laboratory**	**C217**	**217532.1**	**Understand** the ADT/libraries, hash tables and dictionary to design algorithms for a specific problem.
				217532.2	Choose most appropriate data structures and **apply** algorithms for graphical solutions of the problems.
				217532.3	**Apply** and **analyze** non linear data structures to solve real world complex problems

				217532.4	**Apply** and **analyze** algorithm design techniques for indexing, sorting, multi-way searching, file organization and compression.
				217532.5	**Analyze** the efficiency of most appropriate data structure for creating efficient solutions for engineering design situations
Semester-II	**SE**	**Project Based Learning-II**	**C218**	**217533.1**	Identify the real life problem from societal need point of view
				217533.2	Choose and compare alternative approaches to select most feasible one
				217533.3	Analyze and synthesize the identified problem from technological perspective
				217533.4	Design the reliable and scalable solution to meet challenges
				217533.5	Evaluate the solution based on the criteria specified
				217533.6	Inculcate long life learning attitude towards the societal problems
Semester-II	**SE**	**Code of Conduct**	**C219**	**217534.1**	**Understand** the basic perception of profession, professional ethics, various moral and social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
				217534.2	**Aware** of professional rights and responsibilities of an engineer, responsibilities of an engineer for safety and risk benefit analysis.
				217534.3	**Understand** the impact of the professional Engineering solutions in societal and Environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
				217534.4	**Acquire** knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives.

THIRD YEAR (2019 COURSE) COURSE OUTCOMES

Course Code with Course Name					
Course Outcomes of Third Year Engineering Course					
Semester	**Class**	**Course Name**	**Course Code**	**Subject Code**	**Statement**
Semester-I	**TE**	**Database Management Systems**	**C301**	**310241.1**	Analyze and design Database Management System using ER model
				310241.2	Implement database queries using database languages
				310241.3	Normalize the database design using normal forms

				310241.4	Apply Transaction Management concepts in real-time situations
				310241.5	Use NoSQL databases for processing unstructured data
				310241.6	Differentiate between Complex Data Types and analyze the use of appropriate data types
Semester-I	**TE**	**Computer Networks**	**C302**	**317521.1**	Summarize fundamental concepts of Computer Networks, architectures, protocols and technologies
				317521.2	Analyze the working of physical layer protocols.
				317521.3	Analyze the working of different routing protocols and mechanisms
				317521.4	Implement client-server applications using sockets
				317521.5	Illustrate role of application layer with its protocols, client-server architectures
				317521.6	Summarize concepts of MAC and ethernet
Semester-I	**TE**	**Web Technology**	**C303**	**310252.1**	Implement and analyze behavior of web pages using HTML and CSS
				310252.2	Apply the client side technologies for web development
				310252.3	Analyze the concepts of Servlet and JSP
				310252.4	Analyze the Web services and frameworks
				310252.5	Apply the server side technologies for web development
				310252.6	Create the effective web applications for business functionalities using latest web development platforms
Semester-I	**TE**	**Artificial Intelligence**	**C304**	**310253.1**	Identify and apply suitable Intelligent agents for various AI applications
				310253.2	Build smart system using different informed search / uninformed search or heuristic approaches
				310253.3	Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem
				310253.4	Apply the suitable algorithms to solve AI problems
				310253.5	Implement ideas underlying modern logical inference systems

				310253.6	Represent complex problems with expressive yet carefully constrained language of representation
Semester-I	**TE**	**Elective-I Human Computer Interface**	**C305**	**310254.1**	Design effective Human-Computer-Interfaces for all kinds of users
				310245 (B).2	Apply and analyze the user-interface with respect to golden rules of interface
				310245(B) .3	Analyze and evaluate the effectiveness of a user-interface design
				310245(B) .4	Implement the interactive designs for feasible data search and retrieval
				310245(B) .5	Analyze the scope of HCI in various paradigms like ubiquitous computing, virtual reality ,multi-media, World wide web related environments
				310245(B) .6	Analyze and identify user models, user support, and stakeholder requirements of HCI systems
Semester-I	**TE**	**Software Laboratory-I**	**C306**	**317523.1**	Implement SQL queries for given requirements, using different SQL concepts
				317523.2	Implement NoSQL queries using MongoDB
				317523.3	Design and develop application using database considering specific requirements
				317523.4	Design a system using different informed search / uninformed search or heuristic approaches
				317523.5	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
				317523.6	Design and develop an interactive AI application
Semester-I	**TE**	**CN Laboratory**	**C307**	**317524.1**	Analyze the requirements of network types, topology and transmission media
				317524.2	Demonstrate error control, flow control techniques and protocols and analyze them
				317524.3	Demonstrate the subnet formation with IP allocation mechanism and apply various routing algorithms
				317524.4	Develop Client-Server architectures and prototypes
				317524.5	Implement web applications and services using application layer protocols
Semester-I	**TE**	**Elective I Laboratory Human Computer Interface**	**C308**	**317525.1**	To design effective Human-Computer-Interfaces for all kinds of users
				317525.2	To apply and analyze the user-interface with respect to golden rules of interface
				317525.3	To implement the interactive designs for feasible data search and retrieval

Semester-I	**TE**	**Seminar and Technical Communication**	**C309**	**317526.1**	Analysis specialized topic of interest from core area
				317526.2	Enhance Technical writing skills
				317526.3	Targeting specific problem and indentify working solution to resolve it.
				317526.4	Developing professional communication skill
Semester-I	**TE**	**Environmental Studies**	**C310**	**317527.1**	Aware the importance of environment
				317527.2	Understand the water pollution
				317527.3	Know the Air and noise pollution
				317527.4	Understand the E-waste and green computing
Semester-II	**TE**	**Data Science**	**C311**	**317529.1**	Analyze needs and challenges for Data Science CO2: Apply statistics for Data Analytics
				317529.2	Apply the lifecycle of Data analytics to real world problems
				317529.3	Implement Data Analytics using Python programming
				317529.4	Implement data visualization using visualization tools in Python programming
				317529.5	Design and implement Big Databases using the Hadoop ecosystem
				317529.6	Analyze needs and challenges for Data Science CO2: Apply statistics for Data Analytics
Semester-II	**TE**	**Cyber Security**	**C312**	**317530.1**	Gauge the security protections and limitations provided by today's technology.
				317530.2	Identify cyber security threats.
				317530.3	Analyze threats in order to protect or defend it in cyberspace from cyber-attacks.
				317530.4	Build appropriate security solutions against cyber-attacks
Semester-II	**TE**	**Artificial Neural Network**	**C314**	**317531.1**	Understand the basic features of neural systems and be able to build the neural model.
				317531.2	Perform the training of neural networks using various learning rules.
				317531.3	Grasping the use of Associative learning Neural Network
				317531.4	Describe the concept of Competitive Neural Networks
				317531.5	Implement the concept of Convolutional Neural Networks and its models
				317531.6	Use a new tool /tools to solve a wide variety of real-world problems

Semester-II	TE	Elective-II Natural Language Processing	C315	317532.1	Understand the fundamental concepts in field of NLP
				317532.2	Understand morphological aspect and processing in NLP
				317532.3	Distinguish among various techniques of syntax parsing
				317532.4	Understand use of various parsing techniques to parse sentence and extract meaning from its structure.
				317532.5	Apply different Machine translation techniques for translating a source to target language(s)
				317532.6	Design and implement different application using NLP
Semester-II	TE	Software Laboratory II	C316	317533.1	Model artificial Neural Network, and to analyze ANN learning, and its applications
				317533.2	Perform Pattern Recognition, Linear classification.
				317533.3	Develop different single layer/multiple layer Perception learning algorithms
				317533.4	Design and develop applications using neural networks.
Semester-II	TE	Software Laboratory III	C317	317534.1	Apply principles of Data Science for the analysis of real time problems
				317534.2	Implement data representation using statistical methods
				317534.3	Implement and evaluate data analytics algorithms
				317534.4	Perform text preprocessing
				317534.5	Implement data visualization techniques
				317534.6	Use cutting edge tools and technologies to analyze Data
Semester-II	TE	Internship	C318	317535.1	To demonstrate professional competence through industry internship.
				317535.2	To apply knowledge gained through academics to a professional environment during internship.
				317535.3	To select appropriate technology and tools to solve a given real time problem.
				317535.4	To demonstrate abilities of a responsible professional and use ethical practices in day today life.
				317535.5	To create professional and social network and develop relationships with industry people and get exposure to future employers.
				317535.6	To explore various career opportunities in different domains and decide career goals.
mester	TE	Mini Project	C319	317536.1	Identify basic security attacks and services

				317536.2	Analyze the vulnerabilities and design a security solution.
				317536.3	Implement symmetric and asymmetric key algorithms
				317536.4	Demonstrate network security applications, Firewall, Ids

FOURTH YEAR (2020 COURSE) COURSE OUTCOMES

Course Code with Course Name					
Course Outcomes of Fourth Year Engineering Course					
Semester	**Class**	**Course Name**	**Course Code**	**Subject Code**	**Statement**
Semester-I	**BE**	**Machine Learning**	**C401**	**417521.1**	Describe and compare different models of machine learning
				417521.2	Design ML models to make predictions by using linear, non-linear and logistic regression techniques
				417521.3	Implement classification models for two class problems and multiclass problems
				417521.4	Implement clustering models for unlabeled data
				417521.5	Integrate multiple machine learning algorithms in the form of ensemble learning
				417521.6	Apply reinforcement learning and its algorithms for different applications
Semester-I	**BE**	**Data Modeling and Visualization**	**C402**	**417522.1**	Summarize data analysis and visualization in the field of exploratory data science.
				417522.2	Analyze the characteristics and requirements of data and select an appropriate data model
				417522.3	Describe to load, clean, transform, merge and reshape data
				417522.4	Design a probabilistic data modeling, interpretation, and analysis

				417522.5	Evaluate time series data
				417522.6	Integrate real world data analysis problems

Semester-I	**BE**	**Elective III Quantum Artificial Intelligence**	**C403**	**417523A.1**	Understand quantum requirements and formulate design solutions using quantum circuits.
				417523A.2	Illustrate applicable solutions in one or more application domains using a quantum architecture that integrates ethical, social, and legal concerns
				417523A.3	Apply the Advanced Quantum Algorithms on real time problem
				417523A.4	Analyze the quantum machine learning algorithms and their relevant application
				417523A.5	Analyze quantum information processing & its relevant algorithms
				417523A.6	Evaluate suitable algorithms for AI problems
Semester-I	**BE**	**Elective IV Information Retrieval**	**C404**	**417524(B).1**	To understand the basics of Information Retrieval
				417524(B).2	To understand the concepts of Indexing & Query Processing for Information Retrieval
				417524(B).3	To provide comprehensive details about various Evaluation methods
				417524(B).4	To understand the different methods of Text Classification and Clustering
				417524(B).5	To understand various search engine system operations and web structures
				417524(B).6	To understand various applications of Information Retrieval

Semester-I	**BE**	**Computer Laboratory I**	**C405**	**417525.1**	Implement regression, classification and clustering models
				417525.2	Integrate multiple machine learning algorithms in the form of ensemble learning
				417525.3	Apply reinforcement learning and its algorithms for real world applications
				417525.4	Analyze the characteristics, requirements of data and select an appropriate data model
				417525.5	Apply data analysis and visualization techniques in the field of exploratory data science
				417525.6	Evaluate time series data
Semester-I	**BE**	**Computer Laboratory II**	**C406**	**417526 .1**	Evaluate and apply core knowledge of Quantum AI to various real-world problems.
				417526.2	Illustrate and demonstrate Quantum AI tools for different dynamic applications.

Semester-I	**BE**	**Project Stage I**	**C407**	**417527.1**	Solve real life problems by applying knowledge
				417527.2	Analyze alternative approaches, apply and use most appropriate one for feasible solution
				417527.3	Write precise reports and technical documents in a nutshell
				417527.4	Participate effectively in multi-disciplinary and heterogeneous teams exhibiting team work
				417527.5	Inter-personal relationships, conflict management and leadership quality

Semester-I	**BE**	**MOOC**	**C408**	**417528.1**	To acquire additional knowledge and skill
				417528.2	Explore new areas of interest in a relevant field