DADI INSTITUTE OF ENGINEERING &TECHNOLOGY

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An ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018 Certified Institute.
NH-16, Anakapalle – 531002, Visakhapatnam, A.P.
www.diet.edu.in, 9963993229, E-mail: principal@diet.edu.in

S.no	Regulation	Program Code	Program Name	Course code	Course Name	CO	Course outcome: After the completion of the course student will be able to
1	R20	5	CSE	R2031051	COMPUTER NETWORKS	CO1	Demonstrate different network models for networking links OSI, TCP/IP, B-ISDN, N-BISDN and get knowledge about various communication techniques, methods and protocol standards.
						CO2	Discuss different transmission media and different switching networks.
						CO3	Analyze data link layer services, functions and protocols like HDLC and PPP
						CO4	Compare and Classify medium access control protocols like ALOHA, CSMA, CSMA/CD, CSMA/CA, Polling, Token passing, FDMA, TDMA, CDMA protocols
						CO5	Determine application layer services and client server protocols working with the client server paradigms like WWW, HTTP, FTP, e-mail and SNMP etc.
2				R2031052	DESIGN AND ANALYSIS OF ALGORITHMS	CO1	Analyze the performance of a given algorithm, denote its time complexity using the asymptotic notation for recursive and non-

							recursive algorithms
						CO2	List and describe various algorithmic approaches and Solve problems using divide and conquer &greedy Method
						CO3	Synthesize efficient algorithms dynamic programming approaches to solve in common engineering design situations.
						CO4	Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic programming algorithms, and analyze them.
						CO5	Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.
3				R2031053	DATA WAREHOUSING AND DATA MINING	CO1	Illustrate the importance of Data Warehousing, Data Mining and its functionalities and Design schema for real time data warehousing applications.

						CO2	Demonstrate on various Data Preprocessing Techniques viz. data cleaning, data integration, data transformation and data reduction and Process raw data to make it suitable for various data mining algorithms.
						CO3	Choose appropriate classification technique to perform classification, model building and evaluation
						CO4	Make use of association rule mining techniques viz. Apriori and FP Growth algorithms and analyze on frequent itemsets generation
						CO5	Identify and apply various clustering algorithm (with open source tools), interpret, evaluate and report the result.
4				R203105B	Software Project Management	CO1	Apply the process to be followed in the software development life-cycle models
						CO2	Apply the concepts of project management & planning
						CO3	Implement the project plans through managing people, communications and change
						CO4	Conduct activities necessary to successfully complete and close the Software projects

						CO5	Implement communication, modeling, and construction & deployment practices in software development
5				R203104K	**Internet of Things**	CO1	Understand internet of Things and its hardware components.
						CO2	Understand internet of Things and its software components.
						CO3	Interface I/O devices, sensors & communication modules.
						CO4	Remotely monitor data and control devices.
						CO5	Design real time IoT based applications.
6				R2031054	**Data Warehousing and Data Mining Lab**	CO1	Design a data mart or data warehouse for any organization
						CO2	Extract knowledge using data mining techniques and enlist various algorithms used in information analysis of Data Mining Techniques
						CO3	Demonstrate the working of algorithms for data mining tasks such as association rule mining, classification for realistic data
						CO4	Implement and Analyze on knowledge flow application on data sets and Apply the suitable visualization techniques

							to output analytical results
7				R2031055	**Computer Networks Lab**	CO1	Know how reliable data communication is achieved through data link layer.
						CO2	Suggest appropriate routing algorithm for the network.
						CO3	Provide internet connection to the system and its installation.
						CO4	Work on various network management tool
8				R2031057	**CONTINUOUS INTEGRATION AND CONTINUOUS DELIVERY USING DevOps**	CO1	Understand the why, what and how of DevOps adoption
						CO2	Attain literacy on Devops
						CO3	Align capabilities required in the team
						CO4	Create an automated CICD pipeline using a stack of tools
9				R2032051	**MACHINE LEARNING**	CO1	Explain the fundamental usage of the concept Machine Learning system
						CO2	Demonstrate on various regression Technique
						CO3	Analyze the Ensemble Learning Methods
						CO4	Illustrate the Clustering Techniques and Dimensionality Reduction Models in Machine Learning.
						CO5	Discuss the Neural Network Models and

							Fundamentals concepts of Deep Learning
10				R2032052	**COMPILER DESIGN**	CO1	Demonstrate phases in the design of compiler
						CO2	Organize Syntax Analysis, Top Down and LL(1) grammars
						CO3	Design Bottom Up Parsing and Construction of LR parsers
						CO4	Analyze synthesized, inherited attributes and syntax directed translation schemes
						CO5	Determine algorithms to generate code for a target machine
11				R2032053	**Cryptography and Network Security**	CO1	Explain different security threats and countermeasures and foundation course of cryptography mathematics.
						CO2	Classify the basic principles of symmetric key algorithms and operations of some symmetric key algorithms and asymmetric key cryptography
						CO3	Revise the basic principles of Public key algorithms and Working operations of some Asymmetric key algorithms such as RSA, ECC and some more
						CO4	Design applications of hash algorithms, digital signatures and key

							management techniques
						CO5	Determine the knowledge of Application layer, Transport layer and Network layer security Protocols such as PGP, S/MIME, SSL,TSL, and IPsec .
12				R203205C	**Object Oriented Analysis and Design**	CO1	Analyze the nature of complex system and its solutions.
						CO2	Illustrate & relate the conceptual model of the UML, identify & design the classes and relationships
						CO3	Analyze &Design Class and Object Diagrams that represent Static Aspects of a Software System and apply basic and Advanced Structural Modeling Concepts for designing real time applications.
						CO4	Analyze & Design behavioral aspects of a Software System using Use Case, Interaction and Activity Diagrams.
						CO5	Analyze & Apply techniques of State Chart Diagrams and Implementation Diagrams to model behavioral aspects and Runtime environment of Software Systems.
13				R203204R	**Digital Logic Design**	CO1	Differentiate between combinational and sequential circuits based

							on their characteristics and functionalities
						CO2	Demonstrate an understanding of computer functional units
						CO3	Analyze the design and operation of processors, including instruction execution, pipelining, and control unit mechanisms, to comprehend their role in computer systems.
						CO4	Describe memory hierarchy concepts, including cache memory, virtual memory, and secondary storage, and evaluate their impact on system performance and scalability
						CO5	Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices, including interrupts, DMA, and I/O mapping techniques
14				R2032054	**Machine Learning using Python Lab**	CO1	Implement procedures for the machine learning algorithms
						CO2	Design and Develop Python programs for various Learning algorithms
						CO3	Apply appropriate data sets to the Machine Learning algorithms

						CO4	Develop Machine Learning algorithms to solve real world problems
15				R2032055	**Compiler Design Lab**	CO1	Utilize JavaScript for developing interactive HTML web pages and validate form data.
						CO2	Determine predictive parsing table for a CFG
						CO3	Apply Lex and Yacc tools
						CO4	Examine LR parser and generating SLR Parsing table
						CO5	Relate Intermediate code generation for subset C language
16				R2032056	**Cryptography and Network Security Lab**	CO1	Apply the knowledge of symmetric cryptography to implement encryption and decryption using Ceaser Cipher, Substitution Cipher, Hill Cipher
						CO2	Demonstrate the different algorithms like DES, BlowFish, and Rijndael, encrypt the text "Hello world" using Blowfish Algorithm.
						CO3	Analyze and implement public key algorithms like RSA, Diffie-Hellman Key Exchange mechanism, the message digest of a text using the SHA-1 algorithm
17				R2032058	**Skill Oriented Course-IV MEAN Stack Technologies-**	CO1	Develop professional web pages of an application using HTML elements like lists,

					Module I-HTML 5 Java Script .Node.js Express.js and TypeScipt		navigations, tables, various form elements, embedded media which includes images, audio, video and CSS Styles.
						CO2	Utilize JavaScript for developing interactive HTML web pages and validate form data.
						CO3	Build a basic web server using Node.js and also working with Node Package Manager (NPM).
						CO4	Build a web server using Express.js
						CO5	Make use of Typescript to optimize JavaScript code by using the concept of strict type checking
18				R204105A	**Cloud Computing**	CO1	Illustrate the key dimensions of the challenge of Cloud Computing
						CO2	Classify the Levels of Virtualization and mechanism of tools.
						CO3	Analyze Cloud infrastructure including Google Cloud and Amazon Cloud.
						CO4	Create Combinatorial Auctions for cloud resource and design scheduling algorithms for computing cloud
						CO5	Assess control storage systems and cloud security, the risks

							involved its impact and develop cloud application
19				R204105F	**Social Networks & Semantic Web**	CO1	Demonstrate social network analysis and measures.
						CO2	Analyze random graph models and navigate social networks data
						CO3	Apply the network topology and Visualization tools.
						CO4	Analyze the experiment with small world models and clustering models.
						CO5	Compare the application driven virtual communities from social network Structure.
20				R204105I	**Block Chain Technologies**	CO1	Demonstrate the block chain basics, Crypto currency
						CO2	To compare and contrast the use of different private vs. public block chain and use cases
						CO3	Design an innovative Bit coin Block chain and scripts, Block chain Science on Varies coins
						CO4	Classify Permission Block chain and use cases – Hyper ledger, Corda
						CO5	Make Use of Block-chain in E-Governance, Land Registration, Medical Information Systems and others
21				R204104N	**Consumer Electronics**	CO1	Understand the various type of microphones and loud speakers.

						CO2	To identify the various digital and analog signal.
						CO3	Describe the basis of television and composite video signal.
						CO4	Describe the various kind of colour TV standards and system.
						CO5	Compare the various types of digital TV system.
22				R204102M	**Fundamentals of Electric Vehicles**	CO1	To familiarize the students with the need and advantages of electric and hybrid electric vehicles.
						CO2	To understand various power converters used in electric vehicles.
						CO3	To know various architecture of hybrid electric vehicles.
						CO4	To be familiar all the different types of motors suitable for electric vehicles.
						CO5	To have knowledge on latest developments in strategies and other storage systems.
23				R2041011	**Universal Human Values**	CO1	Define the terms like Natural Acceptance, Happiness and Prosperity
						CO2	Identify one's self and one's surroundings (family, society, nature)
						CO3	Apply what they have learnt to their own self in different day-to-day setting in real life
						CO4	Relate human values with human relationships and human

							society
						CO5	Justify the need for universal human values and harmonious existence

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1	DR23	5	CSE	DR2321T051	**Mathematical Foundations of Computer Science**	CO1	Recall the concepts of Mathematical logic and statement & predicate calculus
						CO2	Recall the concepts of combinatorics, set theory, posets and lattices
						CO3	Recall the concepts of algebraic structures, recurrence relations and generating functions
						CO4	Use and interpret the concepts of Mathematical logic and statement & predicate calculus
						CO5	Use and interpret the concepts of c o m b i n a t o r i c s, set theory, posets and lattices
						CO6	Use and interpret the concepts of algebraic structures, recurrence relations and generating functions
						CO7	Apply the concepts of discreet mathematical structures to computer science and engineering
2				DR2321THS1	**Universal Human**	CO1	Define the terms like Natural Acceptance,

					Values– Understanding Harmony & Human Ethical Conduct		Happiness and Prosperity
						CO2	Identify one's self, and one's surroundings (family, society nature)
						CO3	Apply what they have learnt to their own self in different day-to-day settings in real life
						CO4	Relate human values with human relationship and human society
						CO5	Justify the need for universal human values and harmonious existence
						CO6	Develop as socially and ecologically responsible engineers
3				DR2321T052	**Digital Logic & Computer Organization**	CO1	Differentiate between combinational and sequential circuits based on their characteristics and functionalities
						CO2	Demonstrate an understanding of computer functional units
						CO3	Analyze the design and operation of processors, including instruction execution, pipelining, and control unit mechanisms, to comprehend their role in computer systems.
						CO4	Describe memory hierarchy concepts, including cache memory, virtual memory, and secondary storage, and evaluate their impact on system performance and scalability
						CO5	Explain input/output (I/O)

							systems and their interaction with the CPU, memory, and peripheral devices, including interrupts, DMA, and I/O mapping techniques
4				DR2321T053	**Software Engineering**	CO1	Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance
						CO2	Analyse various software engineering models and apply methods for design and development of software projects
						CO3	Develop system designs using appropriate techniques
						CO4	Understand various testing techniques for a software project.
						CO5	Apply standards, CASE tools and techniques for engineering software projects
5				DR2321T054	**Object Oriented Programming Through Java**	CO1	Analyze problems, design solutions using OOP principles, and implement them efficiently in Java
						CO2	Design and implement classes to model real-world entities, with a focus on attributes, behaviours, and relationships between objects
						CO3	Demonstrate an understanding of inheritance hierarchies and polymorphic behaviour, including method overriding and dynamic method dispatch

						CO4	Apply Competence in handling exceptions and errors to write robust and fault-tolerant code
						CO5	Perform file input/output operations, including reading from and writing to files using Java I/O classes, graphical user interface (GUI) programming using JavaFX
6				DR2321L055	**CASE Tools Lab**	CO1	will be able to achieve & demonstrate the following COs on completion of course based learning
7				DR2321L056	**Object Oriented Programming Through Java Lab**	CO1	Demonstrate a solid understanding of Java syntax, including data types, control structures, methods, classes, objects, inheritance, polymorphism, and exception handling.
						CO2	Apply fundamental OOP principles such as encapsulation, inheritance, polymorphism, and abstraction to solve programming problems effectively
						CO3	Familiar with commonly used Java libraries and APIs, including the Collections Framework, Java I/O, JDBC, and other utility classes
						CO4	Develop problem-solving skills and algorithmic thinking, applying OOP concepts to design efficient solutions to various programming challenges

						CO5	Proficiently construct graphical user interface (GUI) applications using JavaFX
8				DR2321LC05	**Python Programming**	CO1	showcase adept command of Python syntax, deftly utilizing variables, data types, control structures, functions, modules, and exception handling to engineer robust and efficient code solutions
						CO2	apply Python programming concepts to solve a variety of computational problems
						CO3	understand the principles of object-oriented programming (OOP) in Python, including classes, objects, inheritance, polymorphism, and encapsulation, and apply them to design and implement Python programs
						CO4	become proficient in using commonly used Python libraries and frameworks such as JSON, XML, NumPy, pandas
						CO5	exhibit competence in implementing and manipulating fundamental data structures such as lists, tuples, sets, dictionaries
9				DR2322TMB1	**Managerial Economics and Financial Analysis**	CO1	Define the concepts related to Managerial Economics, financial accounting and management

						CO2	Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
						CO3	Apply the Concept of Production cost and revenues for effective Business decision
						CO4	Analyze how to invest their capital and maximize returns
						CO5	Evaluate the capital budgeting techniques
						CO6	Develop the accounting statements and evaluate the financial performance of business entity
10				DR2322TES2	**Probability & Statistics**	CO1	Acquire knowledge in finding the analysis of the data quantitatively
						CO2	Develop skills in designing mathematical Models involving probability random variables and the critical thinking in the theory of probability and it's applications in real life problems
						CO3	Apply the theoretical probability distribution like binomial, Poisson and normal in the relevant application areas
						CO4	Analyze to test various hypothesis included in theory and types of errors for large samples
						CO5	Apply the different testing tools like t_test, F_test, chi_square test to analyze the relevant real life problems

11				DR2322T051	**Operating Systems**	CO1	Describe the basics of the operating systems, mechanisms of OS to handle processes, threads, and their communication
						CO2	Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection
						CO3	Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system
						CO4	Illustrate different conditions for deadlock and their possible solutions
						CO5	Analyze the memory management and its allocation policies.
12				DR2322TC51	**Database Management Systems**	CO1	Understand the basic concepts of database management systems
						CO2	Analyze a given database application scenario to use ER model for conceptual design of the database
						CO3	Utilize SQL proficiently to address diverse query challenges
						CO4	Employ normalization methods to enhance database structure
						CO5	Assess and implement transaction processing, concurrency control and database recovery protocols in databases

13				DR2322T052	**Formal Languages and Automata Theory**	CO1	Classify machines by their power to recognize languages
						CO2	Summarize language classes & grammars relationship among them with the help of Chomsky hierarchy
						CO3	Employ finite state machines to solve problems in computing
						CO4	Illustrate deterministic and non-deterministic machines
						CO5	Quote the hierarchy of problems arising in the computer science
14				DR2322L053	**Operating Systems Lab**	CO1	Trace different CPU Scheduling algorithm
						CO2	Implement Bankers Algorithms to Avoid the Dead Lock
						CO3	Evaluate Page replacement algorithms
						CO4	Illustrate the file organization techniques
						CO5	Illustrate Inter process Communication and concurrent execution of threads
15				DR2322LC51	**Database Management Systems Lab**	CO1	Utilizing Data Definition Language (DDL), Data Manipulation Language (DML), and Data Control Language (DCL) commands effectively within a database environment
						CO2	Constructing and execute queries to manipulate and retrieve data from databases

						CO3	Develop application programs using PL/SQL
						CO4	Analyze requirements and design custom Procedures, Functions, Cursors, and Triggers, leveraging their capabilities to automate tasks and optimize database functionality
						CO5	Establish database connectivity through JDBC (Java Database Connectivity)
16				DR2322LCS2	**Full Stack Development –I**	CO1	Design Websites.
						CO2	Apply Styling to web pages
						CO3	Make Web pages interactive
						CO4	Design Forms for applications
						CO5	Choose Control Structure based on the logic to be implemented
17				DR2322LC01	**Design Thinking& Innovation**	CO1	Define the concepts related to design thinking
						CO2	Explain the fundamentals of Design Thinking and innovation
						CO3	Apply the design thinking techniques for solving problems in various sectors.
						CO4	Analyse to work in a multidisciplinary environment
						CO5	Evaluate the value of creativity
						CO6	Formulate specific problem statements of real time issues

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							completion of the course student will be able to
1	DR23	1F - 00	MCA	DR24MCA1101	**BUSINESS COMMUNICATION**		Students develop the awareness about the various media of communication.
							Students become able to communicate effectively in various situations.
							Students will learn different usage the business correspondence serve for effective communication.
2				DR24MCA1102	**MATHEMATICAL AND STATISTICAL FOUNDATIONS**	CO1	Apply the basic rules and theorems of probability theory such as Baye's Theorem, determine probabilities that help to solve engineering problems and to determine the expectation and variance of a random variable from its distribution
						CO2	Able to perform and analyze of sampling, means, proportions, variances and

							estimates the maximum likelihood based on population parameters.
						CO3	Learn how to formulate and test hypotheses about sample means, variances and proportions and to draw conclusions based on the results of statistical tests.
						CO4	Design various ciphers using number theory
						CO5	Apply graph theory for real time problems like network routing problem.
3				DR24MCA1103	**COMPUTER ORGANIZATION & OPERATING SYSTEMS**	CO1	Understand the basic organization of computer and different instruction formats and addressing modes
						CO2	Analyze the concept of pipelining, segment registers and pin diagram of CPU.
						CO3	Understand and analyze various issues related to memory hierarchy
						CO4	Evaluate various modes of data

							transfer between CPU and I/O devices
						CO5	Examine various inter connection structures of multi processors
4				DR24MCA1104	**DATA STRUCTURES**	CO1	Implement basic programs by using C concepts.
						CO2	Select the data structures that efficiently model the information in a problem
						CO3	Assess efficiency trade-offs among different data structure implementations or combinations
						CO4	Implement and know the application of algorithms for sorting and pattern matching.
5				DR24MCA1105	**OBJECT ORIENTED PROGRAMMING WITH JAVA**	CO1	Describe the uses OOP concepts
						CO2	Apply OOP concepts to solve real world problems
						CO3	Distinguish the concept of packages and interfaces
						CO4	Demonstrate the exception handing, multithread applications with

							synchronization
						CO5	Design the GUI based applications using AWT and Swings
						CO6	Discuss the Collection Framework
6				DR24MCA1106	**OPERATING SYSTEMS AND LINUX LAB**	CO1	Implement various CPU scheduling algorithms and compare results
						CO2	Implement various disk scheduling algorithms and compare results
						CO3	Implement page replace algorithms
						CO4	Implement various memory management techniques.
						CO5	Execute basic Linux commands
7				DR24MCA1107	**DATA STRUCTURES LAB**	CO1	Implement various basic data structures and its operations.
						CO2	Apply sorting and searching algorithms to given numbers
						CO3	Implement various tree operations.
						CO4	Implement various graphs algorithms.
						CO5	Develop applications using various data structures
8				DR24MCA1108	**JAVA**	CO1	Apply OOP

					PROGRAMMING LAB		concepts to solve real world problems
						CO2	Implement different forms of inheritance
						CO3	Create packages and to reuse them.
						CO4	Implement multi threaded programs using synchronization concepts
						CO5	Create user defined exceptions
9				DR24MCA1109	**SOCIALLY RELEVANT PROJECT USING DESIGN THINKING**	CO1	Understand the concepts of design thinking approaches
						CO2	Create design thinking teams and conduct design thinking sessions
						CO3	Apply both critical thinking and design thinking in parallel to solve problems
						CO4	Apply some design thinking concepts to their daily work
						CO5	Provide a thinking space for innovation of new ventures, value propositions, new products or services.

10				DR24MCA1201	**DATABASE MANAGEMENT SYSTEMS**	CO1	Illustrate the concept of databases, database management systems, database languages, database structures and their work
						CO2	Apply ER modeling and Relational modeling for designing simple databases.
						CO3	Summarize the concepts related to relational model and SQL and Write database queries using relational algebra and structured query language
						CO4	Design and develop databases from the real world by applying the concepts of Normalization
						CO5	Outline the issues associated with Transaction Management and Recovery, Tree Structured and Hash-Based Indexing
11				DR24MCA1202	**COMPUTER NETWORKS**	CO1	Explain the network architecture, TCP/IP and OSI

							reference models
						CO2	Identify and understand various techniques and modes of transmission
						CO3	Demonstrate the data link protocols, multi-channel access protocols and IEEE 802 standards for LAN
						CO4	Describe routing and congestion in network layer with routing algorithms and classify IPV4 addressing scheme
						CO5	Discuss the elements and protocols of transport layer
						CO6	Develop network security and define various protocols such as FTP, HTTP, Telnet, DNS
12				DR24MCA1203	**SOFTWARE ENGINEERING AND DESIGN PATTERNS**	CO1	Define various software application domains and remember different process model used in software development.
						CO2	Explain needs for software specifications also they can classify

							different types of software requirements and their gathering techniques.
						CO3	Convert the requirements model into the design model and demonstrate use of software and user interface design principles.
						CO4	Illustrate the appropriate design patterns to solve object-oriented design problems.
						CO5	Apply structural patterns to solve design problems
						CO6	Evaluate the design solutions by using behavioral patterns.
13				DR24MCA1204	**DATA WAREHOUSING AND MINING**	CO1	Understand the basics of types of data, quality of data, suitable techniques required for preprocessing and measures required to perform data analysis
						CO2	Describe the need of classification, identify suitable technique(s) to perform classification,

							model building and evaluation
						CO3	Identify the requirements and usage of association rule mining on categorical and continuous data
						CO4	Compare and Identify suitable clustering algorithm(s) (apply with open source tools), interpret, evaluate and report the result
						CO5	Describe the requirements and the need of web mining
14				DR24MCA1205	**DESIGN AND ANALYSIS OF ALGORITHMS**	CO1	Describe asymptotic notation used for denoting performance of algorithms
						CO2	Analyze the performance of a given algorithm and denote its time complexity using the asymptotic notation for recursive and non-recursive algorithms
						CO3	List and describe various algorithmic

							approaches
						CO4	Solve problems using divide and conquer, greedy, dynamic programming, backtracking and branch and bound algorithmic approaches
						CO5	Apply graph search algorithms to real world problems
						CO6	Demonstrate an understanding of NP- Completeness theory and lower bound theory
15				DR24MCA1206	**DBMS LAB**	CO1	Utilize SQL to execute queries for creating database and performing data manipulation operations
						CO2	Examine integrity constraints to build efficient databases
						CO3	Apply Queries using Advanced Concepts of SQL
						CO4	Build PL/SQL programs including stored procedures, functions, cursors and triggers
16				DR24MCA1207	**COMPUTER NETWORKS LAB**	CO1	Comprehend the software

							simulation and hardware implementation of encoding and error control schemes.
						CO2	Illustrate various graphs in computer using various data structures algorithm.
						CO3	Apply the algorithm of shortest path in a graph for single source to single/all destination.
						CO4	Analyze the throughput for random access protocol.
						CO5	Analyze the throughput on hardware for error control method and random-access protocols in data link layer.
17				DR24MCA1208	**SOFTWARE ENGINEERING AND DESIGN PATTERNS LAB**	CO1	Understand software engineering principles involved in building large software programs and process of requirements specification and requirements validation.
						CO2	Understand the concepts of object

							orientation and development of class models
						CO3	Analyze system models for designing patterns.
						CO4	Recognize the importance of software maintenance and complexities involved in software evolution
						CO5	Apply estimation techniques, schedule project activities and compute pricing.

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1	DR23	58	M.Tech.	DR23MCST11	Mathematical Foundations of Computer Science	CO1	To apply the basic rules and theorems of probability theory such as Baye's Theorem, to determine probabilities that help to solve engineering problems and to determine the

							expectation and variance of a random variable from its distribution.
						CO2	Able to perform and analyze of sampling, means, proportions, variances and estimates the maximum likelihood based on population parameters.
						CO3	To learn how to formulate and test hypotheses about sample means, variances and proportions and to draw conclusions based on the results of statistical tests.
						CO4	Design various ciphers using number theory. •
						CO5	Apply graph theory for real time problems like network routing problem
2				DR23MCST12	Advanced Data Structures & Algorithms	CO1	Ability to write and analyze algorithms for algorithm correctness and efficiency

						CO2	Master a variety of advanced abstract data type (ADT) and data structures and their Implementation
						CO3	Demonstrate various searching, sorting and hash techniques and be able to apply and solve problems of real life
						CO4	Design and implement variety of data structures including linked lists, binary trees, heaps, graphs and search trees
						CO5	Ability to compare various search trees and find solutions for IT related problems
3				DR23MCSP1A	Big Data Analytics	CO1	Illustrate on big data and its use cases from selected business domains.
						CO2	Interpret and summarize on NoSQL, Cassandra
						CO3	Analyze the

							HADOOP and Map Reduce technologies associated with big data analytics and explore on Big Data applications Using Hive.
						CO4	Make use of Apache Spark, RDDs etc.to work with datasets.
						CO5	Assess realtime processing with Spark Streaming.
4				DR23MCSP2B	Internet of Things	CO1	Summarize on the term 'internet of things' indifferent contexts. .
						CO2	Analyze various protocols for IoT.
						CO3	Design a Po Co fan IoT system using Rasperry Pi/Arduino
						CO4	Apply data analytics and use cloud offerings related to IoT
						CO5	Analyze applications of IoT in real times cenario

5				DR23MCST13	Research Methodology and IPR	CO1	Ability to distinguish research methods
						CO2	Ability to write and publish a technical research paper.
						CO3	Ability to review papers effectively.
						CO4	IPR and Patent filing.
6				DR23MCSL11	Advanced Data Structures & Algorithms Lab	CO1	Identify classes, objects, members of a class and relationships among them needed for a specific problem.
						CO2	Examine algorithms performance using Prior analysis and asymptotic notations.
						CO3	Organize and apply to solve the complex problems using advanced data structures (like arrays, stacks, queues, linked lists, graphs and trees.)
						CO4	Apply and analyze

							functions of Dictionary
7				DR23MCSL12	Advanced Computing Lab	CO1	The student should have hands on experience in using various sensors like temperature, humidity, smoke, light, etc. and should be able to use control web camera, network, and relays connected to the Pi.
						CO2	Development and use of s IoT technology in Societal and Industrial Applications.
						CO3	Skills to undertake high quality academic and industrial research in Sensors and IoT
						CO4	To classify Real World IoT Design Constraints, Industrial Automation in IoT
8				DR23MCST21	Machine Learning	CO1	Domain Knowledge for Productive use

							of Machine Learning and Diversity of Data.
						CO2	Demonstrate on Supervised and Computational Learning
						CO3	Analyze on Statistics in learning techniques and Logistic Regression
						CO4	Illustrate on Support Vector Machines and Perceptron Algorithm
						CO5	Design a Multilayer Perceptron Networks and classification of decision tree
9				DR23MCST22	Mean Stack Technologies	CO1	Identify the Basic Concepts of Web & Markup Languages
						CO2	Develop web Applications using Scripting Languages & Frameworks.
						CO3	Make use of Express JS and Node JS frameworks
						CO4	Illustrate the uses of web services

							concepts like restful, react js.
						CO5	Adapt to Deployment Techniques & Working with cloud platform.
10				DR23MCSP3A	Advanced Databases and Mining	CO1	Analyze on normalization techniques.
						CO2	Elaborate on concurrency control techniques and query optimization.
						CO3	Summarize the concepts of data mining, data warehousing and data preprocessing strategies.
						CO4	Apply data mining algorithms.
						CO5	Assess various classification & cluster techniques.
11				DR23MCSP4A	Cloud Computing	CO1	Interpret the key dimensions of the challenge of Cloud Computing.
						CO2	Examine the economics, financial, and technological implications for selecting cloud computing for

							own organization.
						CO3	Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications
						CO4	Evaluate own organizations' needs for capacity building and training in cloud computing-related IT areas.
						CO5	To Illustrate Virtualization for Data-Center Automation.
12				DR23MCSL21	Machine Learning with Python Lab	CO1	Implement procedures for the machine learning algorithms
						CO2	Design Python programs for various Learning algorithms
						CO3	Apply appropriate data sets to the Machine Learning algorithms

						CO4	Identify and apply Machine Learning algorithms to solve real world problems
13				DR23MCSL22	Mean Stack Technologies Lab	CO1	Identify the Basic Concepts of Web & Markup Languages.
						CO2	Develop web Applications using Scripting Languages & Frameworks.
						CO3	Creating & Running Applications using JSP libraries.
						CO4	Creating Our First Controller Working with and Displaying in Angular Js and Nested Forms with ng-form.
						CO5	Working with the Files in React JS and Constructing Elements with Data
14					Social Network Analysis	CO1	Demonstrate social network analysis and measures.
						CO2	Analyze random

							graph models and navigate social networks data
						CO3	Apply the network topology and Visualization tools
						CO4	Analyze the experiment with small world models and clustering models
						CO5	Compare the application driven virtual communities from social network Structure.
				P0E05	Industrial Safety		
15					DISSERTATION PHASE – I AND PHASE – II	CO1	Ability to synthesize knowledge and skills previously gained and applied to an in-depth study and execution of new technical problem.
						CO2	Capable to select from different methodologies, methods and forms of analysis to

							produce a suitable research design, and justify their design
						CO3	Ability to present the findings of their technical solution in a written report
						CO4	Presenting the work in International/ National conference or reputed journals.

III-II CSM

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
1	R2032421	COMPUTER NEWORKS	CO1	Demonstrate different network models for networking links OSI, TCP/IP, B-ISDN, N-BISDN and get knowledge about various communication techniques, methods and protocol standards.
			CO2	Discuss different transmission media and different switching networks.

			CO3	Analyze data link layer services, functions and protocols like HDLC and PPP.
			CO4	Compare and Classify medium access control protocols like ALOHA, CSMA, CSMA/CD,CSMA/CA, Polling, Token passing, FDMA, TDMA, CDMA protocols
			CO5	Determine application layer services and client server protocols working with the client server paradigms like WWW, HTTP, FTP, e-mail and SNMP etc.

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
2	R2032422	DEEP LEARNING	CO1	Demonstrate the fundamental concepts learning techniques of Artificial Intelligence, Machine Learning and Deep Learning.
			CO2	Discuss the Neural Network training, various random models.
			CO3	Explain the Techniques of Keras, TensorFlow, Theano and CNTK
			CO4	Classify the Concepts of CNN and RNN
			CO5	Implement Interactive Applications of Deep Learning.

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
3	R2032423	DESIGN & ANALYSIS OF ALGORITHMS	CO1	Analyze the performance of a given algorithm, denote its time complexity using the asymptotic notation for recursive and non-recursive algorithms
			CO2	List and describe various algorithmic approaches and Solve problems using divide and conquer &greedy Method
			CO3	Synthesize efficient algorithms dynamic programming approaches to solve in common engineering design situations.

			CO4	Organize important algorithmic design paradigms and methods of analysis: backtracking, branch and bound algorithmic approaches
			CO5	Demonstrate NP- Completeness theory ,lower bound theory and String Matching
S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
4	R203242A	SOFTWARE PROJECT MANAGEMENT	CO1	Apply the process to be followed in the software development life-cycle models
			CO2	Apply the concepts of project management & planning
			CO3	Implement the project plans through managing people, communications and change
			CO4	Conduct activities necessary to successfully complete and close the Software projects
			CO5	Implement communication, modeling, and construction & deployment practices in software
				development
S.NO	**SUBJECT CODE**	**SUBJECT NAME**	**COURSE OUTCOME**	
5	**R203204Q**	**DATA COMMUNICATIONS**	CO1	**Understand the Fundamentals of Data Communication**:Gain knowledge about data representation, data flow, network types, OSI and TCP/IP models, and networking standards.
			CO2	**Analyze Data Link Layer Operations:**Learn about error detection and correction techniques, flow control mechanisms, and different MAC layer protocols like ALOHA and HDLC.
			CO3	**Explain Network Layer Functions**:Understand IP addressing, packet forwarding, routing algorithms, and the role of protocols like IPv4, ICMP, and RIP.
			CO4	**Comprehend Transport Layer Mechanisms:**Explore UDP and TCP functionalities, connection-oriented and connectionless communication, congestion control, and reliable data transfer.

			CO5	**Apply Networking Principles to Real-World Applications**:Study email protocols (SMTP, POP, IMAP), file transfer protocols (FTP, TFTP), HTTP-based communication, and DNS operations.

III-II CSD

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
1	R2032421	COMPUTER NEWORKS	CO1	Demonstrate different network models for networking links OSI, TCP/IP, B-ISDN, N-BISDN and get knowledge about various communication techniques, methods and protocol standards.
			CO2	Discuss different transmission media and different switching networks.
			CO3	Analyze data link layer services, functions and protocols like HDLC and PPP.
			CO4	Compare and Classify medium access control protocols like ALOHA, CSMA, CSMA/CD,CSMA/CA, Polling, Token passing, FDMA, TDMA, CDMA protocols
			CO5	Determine application layer services and client server protocols working with the client server paradigms like WWW, HTTP, FTP, e-mail and SNMP etc.

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
2	R203244A	DEEP LEARNING	CO1	Demonstrate the fundamental concepts learning techniques of Artificial Intelligence, Machine Learning and Deep Learning
			CO2	Discuss the Neural Network training, various random models
			CO3	Explain the Techniques of Keras, TensorFlow, Theano and CNTK
			CO4	Classify the Concepts of CNN and RNN
			CO5	Implement Interactive Applications of Deep Learning.

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
3	R2032423	DESIGN & ANALYSIS OF ALGORITHMS	CO1	Analyze the performance of a given algorithm, denote its time complexity using the asymptotic notation for recursive and non-recursive algorithms
			CO2	List and describe various algorithmic approaches and Solve problems using divide and conquer &greedy Method
			CO3	Synthesize efficient algorithms dynamic programming approaches to solve in common engineering design situations.
			CO4	Organize important algorithmic design paradigms and methods of analysis: backtracking, branch and bound algorithmic approaches
			CO5	Demonstrate NP- Completeness theory ,lower bound theory and String Matching

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
4	R2032121	BIG DATA AND ANALYTICS	CO1	illustrate big data challenges in different domains including social media, transportation, finance and medicin
			CO2	Use various techniques for mining data stream
			CO3	Design and develop Hadoop
			CO4	Identify the characteristics of datasets and compare the trivial data and big data for various applications
			CO5	Explore the various search methods and visualization techniques

S.NO	**SUBJECT CODE**	**SUBJECT NAME**	**COURSE OUTCOME**	
5	**R203204Q**	**DATA COMMUNICATIONS**	CO1	**Understand the Fundamentals of Data Communication**:Gain knowledge about data representation, data flow, network types, OSI and TCP/IP models, and networking standards.

			CO2	**Analyze Data Link Layer Operations:**Learn about error detection and correction techniques, flow control mechanisms, and different MAC layer protocols like ALOHA and HDLC.
			CO3	**Explain Network Layer Functions**:Understand IP addressing, packet forwarding, routing algorithms, and the role of protocols like IPv4, ICMP, and RIP.
			CO4	**Comprehend Transport Layer Mechanisms:**Explore UDP and TCP functionalities, connection-oriented and connectionless communication, congestion control, and reliable data transfer.
			CO5	**Apply Networking Principles to Real-World Applications**:Study email protocols (SMTP, POP, IMAP), file transfer protocols (FTP, TFTP), HTTP-based communication, and DNS operations.

II II CSM

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
1	DR2322TES2	PROBABILITY & STATISTICS (Basic Science)	CO1	Acquire knowledge in finding the analysis of the data quantitatively
			CO2	Develop skills in designing mathematical Models involving probability random variables and the critical thinking in the theory of probability and it's applications in real life problems
			CO3	Apply the theoretical probability distribution like binomial, Poisson and normal in the relevant application areas
			CO4	Analyze to test various hypothesis included in theory and types of errors for large samples
			CO5	Apply the different testing tools like t_test, F_test, chi_square test to analyze the relevant real life problems
S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
2	DR2322TMB1	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS (Management Course-I)	CO1	Understood the fundementals of Economics, Demand, production, cost revenue and markets
			CO2	Apply the Concept of Production , cost and revenues for Effective business
			CO3	Apply how to Invest and capital and Maximize revenue

			CO4	Evalute Capital budget techniques
			CO5	Develop the Accounting statements and Evalute the Financial performance of Business entity.

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
3	DR2322TC51	DATABASE MANAGEMENT SYSTEMS (Professional core)	CO1	Understand the basic concepts of database management systems
			CO2	Analyze a given database application scenario to use ER model for conceptual design of the database
			CO3	Utilize SQL proficiently to address diverse query challenges
			CO4	Employ normalization methods to enhance database structure
			CO5	Assess and implement transaction processing, concurrency control and database recovery protocols in databases

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
4	DR2322T421	MACHINE LEARNING (Professional core	CO1	Understand the features of machine learning to apply on real world problems
			CO2	Design and evaluate intelligent expert models for perception and prediction from intelligent environment
			CO3	Formulate valid solutions for problems involving uncertain inputs or outcomes by using decision making techniques
			CO4	Solve the classification problem using Bayesian Learning Model
			CO5	Understand the concepts of ciustering, Fuzzy C Means

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
5	DR2322TC01	DIGITIAL LOGIC & COMPUTER ORGANIZATION (Professional core	CO1	Boolean algebra to simplify and analyze digital circuits.
			CO2	Ability to design and implement combinational circuits and encoders.
			CO3	flip-flops, registers, counters, and state machines.
			CO4	Knowledge of Computer Organization and

				Architecture
			CO5	Assembly Language Programming

II-II DR23 CSD				
S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
1	DR2322TES2	PROBABILITY & STATISTICS (Management course-1)	CO1	Acquire knowledge in finding the analysis of the data quantitatively
			CO2	Develop skills in designing mathematical Models involving probability random variables and the critical thinking in the theory of probability and it's applications in real life problems
			CO3	Apply the theoretical probability distribution like binomial, Poisson and normal in the relevant application areas
			CO4	Analyze to test various hypothesis included in theory and types of errors for large samples
			CO5	Apply the different testing tools like t_test, F_test, chi_square test to analyze the relevant real life problems
S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
2	DR2322T441	DATA ENGINEERING (Professional core)	CO1	Explain basic concepts of Data Engineering
			CO2	Discuss about Data Engineering Life Cycle
			CO3	How to design Good Data Architecture
			CO4	Nil
			CO5	Nil
S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
3	DR2322TC51	DATABASE MANAGEMENT SYSTEMS (Professional core)	CO1	Understand the basic concepts of database management systems
			CO2	Analyze a given database application scenario to use ER model for conceptual design of the database
			CO3	Utilize SQL proficiently to address diverse query challenges

			CO4	Employ normalization methods to enhance database structure
			CO5	Assess and implement transaction processing, concurrency control and database recovery protocols in databases

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
4	DR2322TES3	STATISTICAL METHODS FOR DATA SCIENCE (Engineering Science/Basic Science)	CO1	Understand the basic concepts of Statistics
			CO2	Analyze the data and draw conclusion about collection of data under study using point estimation
			CO3	Analyze to test various hypothesys included in theory and types of errors for large samples
			CO4	Analyze the data and draw conclusion about collection of data under study using interval estimation
			CO5	Apply the different testing tools like T-test, F-test,chi-square test to analyze the relevant real life problems

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
5	DR2322TC01	DIGITIAL LOGIC & COMPUTER ORGANIZATION (Professional core)	CO1	Boolean algebra to simplify and analyze digital circuits.
			CO2	Ability to design and implement combinational circuits and encoders.
			CO3	flip-flops, registers, counters, and state machines.
			CO4	Knowledge of Computer Organization and Architecture
			CO5	Assembly Language Programming

III-I R20 CSM

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
1	R2031421	COMPILER DESIGN	CO1	Demonstrate phases in the design of compiler
			CO2	organize syntax analysis, Top Down and LL(1) grammar
			CO3	Design Bottom up parsing and construction of LR parsers

			CO4	Analyze synthesized inherited attributes and syntax directed translation schemes
			CO5	Determine algorithms to generate code for a target machine
S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
2	R2031422	OPERATING SYSTEMS	CO1	Describe various generations of Operating System and functions of Operating System
			CO2	Describe the concept of program, process and thread and analyze various CPU Scheduling Algorithms and compare their performance
			CO3	Solve Inter Process Communication problems using Mathematical Equations by various methods
			CO4	Compare various Memory Management Schemes especially paging and Segmentation in Operating System and apply various Page Replacement Techniques
			CO5	Outline File Systems in Operating System like UNIX/Linux and Windows
S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
3	R2031423	MACHINE LEARNING	CO1	the fundamental usage of the concept Machine Learning system
			CO2	Demonstrate on various regression Technique
			CO3	Analyze the Ensemble Learning Methods
			CO4	Illustrate the Clustering Techniques and Dimensionality Reduction Models in Machine Learning.
			CO5	Discuss the Neural Network Models and Fundamentals concepts of Deep Learning
S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
4	R203142A	SOFTWARE ENGINEERING	CO1	Ability to transform an Object-Oriented Design into high quality, executable code
			CO2	Skills to design, implement, and execute test cases at the Unit and Integration level
			CO3	Compare conventional and agile software methods

			CO4	Nil
			CO5	Nil
S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
5	R203105E	INTERNET OF THINGS AND APPLICATIONS	CO1	Understand internet of Things and its hardware components.
			CO2	Understand internet of Things and its software components.
			CO3	Interface I/O devices, sensors & communication modules.
			CO4	Remotely monitor data and control devices.
			CO5	Design real time IoT based applications.

III-I R20 CSD				
S.NO	**SUBJECT CODE**	**SUBJECT NAME**	**COURSE OUTCOME**	
1	R2031421	COMPILER DESIGN	CO1	Demonstrate phases in the design of compiler
			CO2	organize syntax analysis, Top Down and LL(1) grammar
			CO3	Design Bottom up parsing and construction of LR parsers
			CO4	Analyze synthesized inherited attributes and syntax directed translation schemes
			CO5	Determine algorithms to generate code for a target machine
S.NO	**SUBJECT CODE**	**SUBJECT NAME**	**COURSE OUTCOME**	
2	R2031422	OPERATING SYSTEMS	CO1	Describe various generations of Operating System and functions of Operating System
			CO2	Describe the concept of program, process and thread and analyze various CPU Scheduling Algorithms and compare their performance
			CO3	Solve Inter Process Communication problems using Mathematical Equations by

				various methods
			CO4	Compare various Memory Management Schemes especially paging and Segmentation in Operating System and apply various Page Replacement Techniques
			CO5	Outline File Systems in Operating System like UNIX/Linux and Windows

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
3	R2031423	MACHINE LEARNING	CO1	the fundamental usage of the concept Machine Learning system
			CO2	Demonstrate on various regression Technique
			CO3	Analyze the Ensemble Learning Methods
			CO4	Illustrate the Clustering Techniques and Dimensionality Reduction Models in Machine Learning.
			CO5	Discuss the Neural Network Models and Fundamentals concepts of Deep Learning

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
4	R203142A	SOFTWARE ENGINEERING	CO1	Ability to transform an Object-Oriented Design into high quality, executable code
			CO2	Skills to design, implement, and execute test cases at the Unit and Integration level
			CO3	Compare conventional and agile software methods
			CO4	Nil
			CO5	Nil

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
5	R203105E	INTERNET OF THINGS AND APPLICATIONS	CO1	Understand internet of Things and its hardware components.
			CO2	Understand internet of Things and its software components.
			CO3	Interface I/O devices, sensors & communication modules.
			CO4	Remotely monitor data and control devices.

			CO5	Design real time IoT based applications.

II-I CSM

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
1	DR2321T054	OBJECT ORIENTED PROGRAMMING through JAVA (Professional core	CO1	Identify the syntax and semantics of java programming language and basic concepts of Java.
			CO2	Understand the basic concepts of object-oriented programming
			CO3	Develop reusable programs using the concepts of inheritance,Polymorphism and interfaces.
			CO4	Apply the concepts of packages, exception handling & I/O streams to develop secure, error free, and efficient applications
			CO5	Design multithreaded and GUI based applications which mimic the real word scenarios.

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
2	DR2321T422	Principles of Artificial Intelligence (Professional core)	CO1	Knowledge in Computer Programming
			CO2	A course on "Mathematical Foundations of Computer Science
			CO3	Background in linear algebra, data structures and algorithms, and probability
			CO4	nil
			CO5	nil

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
3	DR2321T423	Advanced Data Structures and Algorithm Analysis (Professional core)	CO1	Illustrate several sub-quadratic sorting algorithms.
			CO2	Demonstrate recursive methods
			CO3	Apply advanced data structures such as balanced search trees, hash tables, priority queues and the disjoint set union/find data structure

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
4	DR2321T421	Descrete Mathematics and Graph Theory (Basic	CO1	Recall the concepts of combinatorics, set theory,posetsand lattices

		Science)	CO2	Recall the concepts of algebraic structures, recurrance relations and generating functions
			CO3	use and interpret the concepts of mathematical logic and statement & predicate calculus
			CO4	use and interpret the concepts of combinatory, set theory, pose and lattices
			CO5	use and interpret the concepts of algebraic structures, recurrance relations and generating functions
S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
5	DR2321THS1	Universal Human Values - Understanding harmony and ethical Human Conduct (Managemant Studies)- open elective-IV	CO1	By the end of the course,students are expected to become more of them selves,and their surroundings (family,society,nature);they would become more responsible in life,and in handling problems with sustainable solutions,while keeping human relationships and human nature mind.
			CO2	they would have better critical ability.
			CO3	they would also become sensitive to their commitment towards what they have understood (human vcalues,human relationships and human socity)
			CO4	it is hoped that they would be able to apply what they have learnt to their own self in different day to day settings in real life,at least a begining would be made in this direction.
			CO5	Nil

II-I DR23 CSD				
S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
1	DR2321T054	OBJECT ORIENTED PROGRAMMING through JAVA (Professional core	CO1	Identify the syntax and semantics of java programming language and basic concepts of Java.
			CO2	Understand the basic concepts of object-oriented programming
			CO3	Develop reusable programs using the concepts of inheritance,Polymorphism and interfaces.
			CO4	Apply the concepts of packages, exception handling & I/O streams to develop secure, error free, and efficient applications

			CO5	Design multithreaded and GUI based applications which mimic the real word scenarios.

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
2	DR2321T441	Introuction to Data Science (Professional core)	CO1	identify the key components of the data science process
			CO2	acquire and clean data from various sources
			CO3	perform exploratory data analysis using visualization techniques
			CO4	apply basic statistical methods, build and evaluate simple predictive models
			CO5	understanding the ethical considerations involved in data science practices

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
3	DR2321T423	Advanced Data Structures and Algorithm Analysis (Professional core)	CO1	Illustrate several sub-quadratic sorting algorithms.
			CO2	Demonstrate recursive methods
			CO3	Apply advanced data structures such as balanced search trees, hash tables, priority queues and the disjoint set union/find data structure

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
4	DR2321T421	Descrete Mathematics and Graph Theory (Basic Science)	CO1	Recall the concepts of combinatorics, set theory,posetsand lattices
			CO2	Recall the concepts of algebraic structures, recurrance relations and generating functions
			CO3	use and interpret the concepts of mathematical logic and statement & predicate calculus
			CO4	use and interpret the concepts of combinatory, set theory, pose and lattices
			CO5	use and interpret the concepts of algebraic structures, recurrance relations and generating functions

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
5	DR2321THS1	Universal Human Values - Understanding harmony and ethical Human Conduct (Managemant Studies)	CO1	Define the terms like Natural Acceptance, Happiness and Prosperity
			CO2	Identify one's self and one's surroundings (family, society, nature)
			CO3	Apply what they have learnt to their own self in different day-to-day setting in real life
			CO4	Relate human values with human relationships and human society
			CO5	Justify the need for universal human values and harmonious existence

IV-I R20 CSM

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
1	R204142Q	Social Network Analysis (Professional elective-V)	CO1	Know basic notation and terminology used in network science
			CO2	Be able to visualize,summarize and compare networks
			CO3	Illustrate basic principles behind network analysis algorithms
			CO4	Develop practical skills of network analysis inR programming language
			CO5	Be capable of analyzing real work networks

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
2	R2041420	Cloud Computing (Professional elective-IV)	CO1	Illustrate the key dimensions of the challenge of Cloud Computing
			CO2	Classify the Levels of Virtualization and mechanism of tools.
			CO3	Analyze Cloud infrastructure including Google Cloud and Amazon Cloud.
			CO4	Create Combinatorial Auctions for cloud resource and design scheduling algorithms for computing cloud
			CO5	Assess control storage systems and cloud security, the risks involved its impact and develop cloud application

S.NO	SUBJECT	SUBJECT NAME	COURSE OUTCOME

	CODE			
3	R204105I	Block Chain Technologies (Professional elective-III)	CO1	Demonstrate the block chain basics, Crypto currency
			CO2	To compare and contrast the use of different private vs. public block chain and use cases
			CO3	Design an innovative Bit coin Block chain and scripts, Block chain Science on varies coins
			CO4	Classify Permission Block chain and use cases – Hyper ledger, Corda
			CO5	Make Use of Block-chain in E-Governance, Land Registration, Medical Information Systems and others
S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
4	R204102M	Fundamental Electrical Vehicles (Open Elective-III)	CO1	To familiarize the students with the need and advantages of electric and hybrid electric vehicles.
			CO2	To understand various power converters used in electric vehicles.
			CO3	To know various architecture of hybrid electric vehicles.
			CO4	To be familiar all the different types of motors suitable for electric vehicles.
			CO5	To have knowledge on latest developments in strategies and other storage systems.
S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
5	R204104N	Consumer Electronics (Open Elective-IV)	CO1	Understand the various type of microphones and loud speakers.
			CO2	To identify the various digital and analog signal.
			CO3	Describe the basis of television and composite video signal.
			CO4	Describe the various kind of colour TV standards and system.
			CO5	Compare the various types of digital TV system.
S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
6	R2041011	Universal Human Values 2:	CO1	Define the terms like Natural Acceptance,

		Understanding Harmony(HS)		Happiness and Prosperity
			CO2	Identify one's self and one's surroundings (family, society, nature)
			CO3	Apply what they have learnt to their own self in different day-to-day setting in real life
			CO4	Relate human values with human relationships and human society
			CO5	Justify the need for universal human values and harmonious existence

IV-I R20 CSD

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
1	R204112C	Social Network Analysis (Professional elective-V)	CO1	Know basic notation and terminology used in network science
			CO2	Be able to visualize,summarize and compare networks
			CO3	Illustrate basic principles behind network analysis algorithms
			CO4	Develop practical skills of network analysis inR programming language
			CO5	Be capable of analyzing real work networks

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
2	R2041420	Cloud Computing (Professional elective-IV)	CO1	Illustrate the key dimensions of the challenge of Cloud Computing
			CO2	Classify the Levels of Virtualization and mechanism of tools.
			CO3	Analyze Cloud infrastructure including Google Cloud and Amazon Cloud.
			CO4	Create Combinatorial Auctions for cloud resource and design scheduling algorithms for computing cloud
			CO5	Assess control storage systems and cloud security, the risks involved its impact and develop cloud application

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
3	R204105I	Block Chain Technologies (Professional elective-III)	CO1	Demonstrate the block chain basics, Crypto currency

			CO2	To compare and contrast the use of different private vs. public block chain and use cases
			CO3	Design an innovative Bit coin Block chain and scripts, Block chain Science on varies coins
			CO4	Classify Permission Block chain and use cases – Hyper ledger, Corda
			CO5	Make Use of Block-chain in E-Governance, Land Registration, Medical Information Systems and others

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
4	R204102M	Fundamental Electrical Vehicles (Open Elective-III)	CO1	To familiarize the students with the need and advantages of electric and hybrid electric vehicles.
			CO2	To understand various power converters used in electric vehicles.
			CO3	To know various architecture of hybrid electric vehicles.
			CO4	To be familiar all the different types of motors suitable for electric vehicles.
			CO5	To have knowledge on latest developments in strategies and other storage systems.

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
5	R204104N	Consumer Electronics (Open Elective-III)	CO1	Understand the various type of microphones and loud speakers.
			CO2	To identify the various digital and analog signal.
			CO3	Describe the basis of television and composite video signal.
			CO4	Describe the various kind of colour TV standards and system.
			CO5	Compare the various types of digital TV system.

S.NO	SUBJECT CODE	SUBJECT NAME	COURSE OUTCOME	
6	R2041011	Universal Human Values 2: Understanding Harmony(HS)	CO1	Define the terms like Natural Acceptance, Happiness and Prosperity
			CO2	Identify one's self and one's surroundings (family, society, nature)

			CO3	Apply what they have learnt to their own self in different day-to-day setting in real life
			CO4	Relate human values with human relationships and human society
			CO5	Justify the need for universal human values and harmonious existence

S. No	Regulation	Program Code	Program Name	Course code	Course Name	CO	Course outcome: After the completion of the course student will be able to
1	DR23	1	Civil Engineering	DR2321T011	NUMERICAL AND STATISTICAL METHODS	CO 1	Apply numerical methods to solve algebraic and transcendental equations.
						CO 2	Derive interpolating polynomials using interpolation formulae.
						CO 3	Solve differential and integral equations numerically.
						CO 4	To identify real life problems into Mathematical Models.
						CO 5	To apply the probability theory and testing of hypothesis in the field of civil engineering Applications.
2	DR23	1	Civil Engineering	DR2321T013	STRENGTH OF MATERIALS	CO 1	Explain the basic materials' behavior under the influence of different external loading and support conditions.

						CO 2	Illustrate diagrams indicating the variation of key performance features like axial forces, bending moments, and shear forces in structural members.
						CO 3	Understand and calculate section modulus for determining stresses developed in beams.
						CO 4	Analyze deflections due to various loading conditions.
						CO 5	Evaluate stresses across sections of thin and thick cylinders and columns to determine optimum sections to withstand internal pressure using Lame's equation.
3	DR23	1	Civil Engineering	DR2321T014	FLUID MECHANICS	CO 1	Explain the principles of fluid statics, kinematics, and dynamics.
						CO 2	Apply the laws of fluid statics and concepts of buoyancy.
						CO 3	Describe the fundamentals of fluid kinematics and differentiate between types of fluid flows.
						CO	Apply the principle

						4	of conservation of energy for flow measurement.
						CO 5	Analyze the losses in pipes and discharge through pipe networks.
4	DR23	1	Civil Engineering	DR2321T012	SURVEYING AND GEOMETRICS	CO 1	Utilize the principles & methods of surveying to measure horizontal & vertical distances and angles.
						CO 2	Recognize the basic principles of compass surveying, such as traversing and calculating angles.
						CO 3	Diagnose sources of errors and implement rectification methods.
						CO 4	Grasp the fundamentals of theodolite surveying, such as trigonometric leveling and traversing.
						CO 5	Set out curves and operate modern surveying equipment.
5	DR23	1	Civil Engineering	DR2321THS1	UNIVERSAL HUMAN VALUES-I	CO 1	Define the terms like Natural Acceptance, Happiness and Prosperity.
						CO 2	Identify one's self, and one's surroundings

							(family, society and nature).
						CO 3	Apply what they have learnt to their own self in different day-to-day settings in real life.
						CO 4	Relate human values with human relationship and human society.
						CO 5	Justify the need for universal human values and harmonious existence and Develop as socially and ecologically responsible engineers.
6	DR23	1	Civil Engineering	DR2321M1AC	ENVIRONMENTAL SCIENCE	CO 1	To make the students to get awareness on environment.
						CO 2	To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life.
						CO 3	To save earth from the inventions by the engineers.
						CO 4	Understand the social issues and the environment and apply some measures to protect

							the environment.
						CO 5	To forecaste the human population and understand the effects of increase in population on environment.
7	DR23	1	Civil Engineering	DR2321L016	STRENGTH OF MATERIALS LAB	CO 1	Conduct tensile strength tests and illustrate stress-strain diagrams for ductile metals (Apply).
						CO 2	Perform bending tests and determine load-deflection curves for steel/wood (Analyze).
						CO 3	Conduct torsion tests and calculate torsion parameters(Apply).
						CO 4	Perform hardness, impact, and shear strength tests, and compute hardness numbers, impact, and shear strengths (Evaluate).
						CO 5	Conduct tests on closely coiled and open coiled springs and compute deflections (Apply).
8	DR23	1	Civil Engineering	DR2321L015	SURVEYING LAB	CO 1	Operate various linear and angular measuring instruments.
						CO 2	Record linear and angular measurements

							accurately.
						CO 3	Calculate area and volume by analyzing data obtained from surveying activities.
						CO 4	Utilize modern equipment such as a total station.
						CO 5	Compile field notes from survey data.
9	DR23	1	Civil Engineering	DR2322TMB1	Managerial Economics and Financial Analysis	CO 1	Define the concepts related to Managerial Economics, financial accounting and management (Understand).
						CO 2	Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets (Understand).
						CO 3	Apply the Concept of Production cost and revenues for effective Business decision (Apply).
						CO 4	Analyze how to invest their capital and maximize returns, Evaluate the capital budgeting techniques (Analyze, Evaluate).
						CO 5	Develop the accounting statements and evaluate the

							financial performance of business entity (Create).
10	DR23	1	Civil Engineering	DR2322TES1	Engineering Geology	CO 1	Explain the significance of geological agents on the Earth's surface and their importance in civil engineering. (Understand).
						CO 2	Identify and understand the properties of megascopic minerals and rocks. (Understand).
						CO 3	Describe the concepts of groundwater and its geophysical methods and apply knowledge to identify site parameters such as contour, slope, and aspect for topography. (Understand, Apply).
						CO 4	Classify earthquake-prone areas, landslides, and subsidence zones, and measure these hazards to practice hazard zonation. (Analyze).
						CO 5	Investigate project sites for civil engineering projects, including site

							selection for mega projects like dams, reservoirs, and tunnels, using strike and dip problem-solving. (Evaluate, Analyze).
11	DR23	1	Civil Engineering	DR2322T011	Building Materials and Concrete Technology	CO 1	Know various engineering properties of building construction materials and suggest their suitability (Understand).
						CO 2	Describe the basic ingredients of concrete and their role in its production and behavior in the field and Test the properties of fresh and hardened concrete. (Apply).
						CO 3	Explain the basic concepts of concrete. (Understand).
						CO 4	Design the concrete mix using the BIS method. (Apply).
						CO 5	Evaluate the ingredients of concrete through lab test results and recognize the importance of concrete quality. (Evaluate).
12	DR23	1	Civil Engineeri	DR2322T012	Structural Analysis	CO 1	Apply energy theorems to evaluate

			ng				trusses. (Apply).
						CO 2	Analyze indeterminate structures using Castigliano's Second Theorem. (Analyze).
						CO 3	Analyze the behavior of fixed and continuous beams. (Analyze).
						CO 4	Evaluate continuous beams and portal frames using the slope-deflection method. (Evaluate).
						CO 5	Evaluate continuous beams and portal frames using the moment-distribution method. (Evaluate).
13	DR23	1	Civil Engineering	DR2322T013	Hydraulics and Hydraulic Machinery	CO 1	Explain the importance of testing cement. (Understand).
						CO 2	Describe the properties of cement. (Understand).
						CO 3	Evaluate different properties of aggregates. (Evaluate).
						CO 4	Analyze fresh concrete properties and their relevance to hardened concrete. (Analyze).
						CO 5	Evaluate hardened concrete properties. (Evaluate).

14	DR23	1	Civil Engineering		Engineering Geology Lab	CO 1	Identify Megascopic minerals & their properties (Analyze).
						CO 2	Identify Megascopic rocks & their properties (Analyze).
						CO 3	Identify the site parameters such as contour, slope & aspect for topography (Analyze).
						CO 4	Know the occurrence of materials using the strike & dip problems (Understand).
						CO 5	Identify the topography of the site & material selection (Analyze).
15	DR23	1	Civil Engineering	DR2322L015	Building Planning and Drawing	CO 1	Plan various buildings according to the building by-laws. (Create).
						CO 2	Analyze the relationship between the plan, elevation, and cross-section to identify the form and functions among buildings. (Analyze).
						CO 3	Illustrate signs and bonds. (Apply).
						CO 4	Illustrate different building units. (Apply).

						CO 5	Develop the skills to draw building elements and plan buildings according to requirements. (Create).
16	DR23	1	Civil Engineering	DR2322LC01	Design Thinking and Innovation	CO 1	Define the concepts related to design thinking. (Remember, Understand).
						CO 2	Explain the fundamentals of Design Thinking and innovation (Remember, Understand).
						CO 3	Apply the design thinking techniques for solving problems in various sectors. (Apply).
						CO 4	Analyse to work in a multidisciplinary environment (Analyze).
						CO 5	Evaluate the value of creativity and Formulate specific problem statements of real time issues (Apply, Evaluate, Create).
17	R20	1	Civil Engineering	R2031011	STRUCTURAL ANALYSIS	CO 1	Distinguish between the determinate and indeterminate structures.
						CO 2	Identify the behavior of structures due to the expected loads,

							including the moving loads, acting on the structure.
						CO 3	Estimate the bending moment and shear forces in beams for different fixity conditions.
						CO 4	Analyze the continuous beams using various methods -, three moment method, slope deflection method, energy theorems and Draw the influence line diagrams for various types of moving loads on beams/bridges.
						CO 5	Analyze the loads in Pratt and Warren trusses when loads of different types and spans are passing over the truss.
18	R20	1	Civil Engineering	R2031012	DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES	CO 1	Work on different types of design methods.
						CO 2	Carryout analysis and design of flexural members and detailing.
						CO 3	Design structures subjected to shear, bond and torsion.
						CO 4	Design different type of compression members and footings.

						CO 5	Familiarize with design of compression members under different types of loading.
19	R20	1	Civil Engineering	R2031013	GEOTECHNICAL ENGINEERING-I	CO 1	Understand the definition of the various quantities related to soil mechanics and establish their inter-relationships.
						CO 2	Understand the methods of determination of the various index properties of the soils and classify the soils.
						CO 3	Understand the importance of the different engineering properties of the soil such as compaction, permeability, consolidation and shear strength and determine them in the laboratory.
						CO 4	Impart the principles of compaction and consolidation of soils and determine the magnitude and the rate of consolidation settlement.
						CO 5	Apply all the geotechnical concepts in day-to-day civil engineering

							practice.
20	R20	1	Civil Engineering	R203101J	ENVIRONMENTAL MANAGEMENT	CO 1	Plan and design the water and wastewater systems.
						CO 2	Identify the source of emissions and select proper control systems.
						CO 3	Design & estimation of water supply system for a city.
						CO 4	Gain knowledge about various environmental aspects.
						CO 5	Selection of suitable treatment flow for raw water treatments.
21	R20	1	Civil Engineering	R203101A	CONSTRUCTION TECHNOLOGY MANAGEMENT	CO 1	Appreciate the importance of construction planning.
						CO 2	Understand the functioning of various earth moving equipment.
						CO 3	Know the methods of production of aggregate products and concreting.
						CO 4	Understand the importance of safety in construction projects.
						CO 5	Apply the gained knowledge to project management and construction techniques.
22	R20	1	Civil	R2031017	PROFESSIONAL	CO	Create awareness of

			Engineering		ETHICS AND HUMAN VALUES	1	Ethics and moral values.
						CO 2	Understand the importance of Ethics and code of conduct in business.
						CO 3	Understand social responsibility in business and importance of human values.
						CO 4	Professional Ethical values and contemporary issues.
						CO 5	Excelling in competitive and challenging environment to contribute to industrial growth.
23	R20	1	Civil Engineering	R2031014	SURVEYING FIELD WORK-II LAB (SURVEYING CAMP LAB)	CO 1	Use the surveying tools like Theodolite and Total Station in the field.
						CO 2	Take linear and angular measurements, booking and plotting accurately.
						CO 3	Locate the position of the object after finding the distance and heights using stadia, tangential and trignometrical principle.
						CO 4	Set out a simple circular curve in the field.
						CO 5	Obtaining different elevations by levelling.

24	R20	1	Civil Engineering	R2031015	GEOTECHNICAL ENGINEERING LAB	CO 1	Determine the index properties for soil classification – Grain size distribution &Atterberg's limits.
						CO 2	Determine the engineering properties – Permeability, Compaction, consolidation, shear strength parameters& CBR value.
						CO 3	Impart knowledge of determination of index properties required for classification of soils.
						CO 4	Determine compaction characteristics and consolidation behavior from relevant lab tests; to determine permeability of soils.
						CO 5	Determine shear parameters of soil through different laboratory tests.
25	R20	1	Civil Engineering	R2031016	SKILL ORIENTED COURSE - II DESIGN OF SPECIAL STRUCTURES	CO 1	Gain Professional knowledge in the design and construction of Industrial chimneys and Water tanks.
						CO 2	Gain Professional knowledge in the

							design of service reservoir and Estimation of drains for village.
						CO 3	Understand the design of spillway for low and medium height dams.
						CO 4	Estimate the concrete roads and rain water harvesting ponds.
						CO 5	Evaluate all the design elements of special structures.
26	R20	1	Civil Engineering	R2032011	Design and drawing of Steel Structures	CO 1	Work with relevant IS codes (Understand).
						CO 2	Carryout analysis and design of flexural members and detailing (Analyze).
						CO 3	Design compression members of different types with connection detailing (Evaluate).
						CO 4	Design Plate Girder and Gantry Girder with connection detailing (Evaluate).
						CO 5	Produce the drawings pertaining to different components of steel structures (Create).
27	R20	1	Civil Engineering	R2032012	Water Resource Engineering	CO 1	Understanding of the theories and principles governing the hydrologic processes

							(Understand).
						CO 2	Quantify hydrologic components and apply concepts in hydrologic design of water resources projects (Analyze).
						CO 3	Develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures (Create).
						CO 4	Develop design storms and carry out frequency analysis (Evaluate).
						CO 5	Develop flow mass curve and flow duration curve, apply hydrograph analysis in the design of water resources projects and unit hydrograph and synthetic hydrograph (Create).
28	R20	1	Civil Engineering	R2032013	Geotechnical Engineering-II	CO 1	Understand the various types of shallow foundations and decide on their location based on soil characteristics (Understand).
						CO 2	Compute the magnitude of foundation settlement and decide on the size of the foundation accordingly (Evaluate).

						CO 3	Use the field test data and arrive at the bearing capacity (Understand).
						CO 4	Apply the principles of bearing capacity of piles and design them accordingly (Apply).
						CO 5	Impart the principles of important field tests such as SPT and Plate bearing test (Apply).
29	R20	1	Civil Engineering	R203201C	Road Safety Engineering	CO 1	Understand fundamental of Traffic Engineering (Understand).
						CO 2	Investigate & determine the collective factors & remedies of accident involved (Evaluate).
						CO 3	Design & planning various road geometrics (Evaluate).
						CO 4	Implement the traffic system from road safety point of view (Create).
						CO 5	Understand role of road safety in planning the urban infrastructures design (Understand).
30	R20	1	Civil Engineering	R203201E	Elements of Civil Engineering	CO 1	Understand basics of Civil Engineering concepts (Understand).
						CO 2	Understand the surveying the

							elevations and mapping (Understand).
						CO 3	Understand the construction materials and elements (Understand).
						CO 4	Understand water resource development (Understand).
						CO 5	Understand overall infrastructure development (Understand).
31	R20	1	Civil Engineering	R2032014	Estimation, Costing and Contracts Lab	CO 1	Determine the quantities of different components of buildings (Evaluate).
						CO 2	Find the cost of various building components (Evaluate).
						CO 3	Capable of finalizing the value of structures (Evaluate).
						CO 4	Learn various specifications and components of the buildings (Understand).
						CO 5	Rate analysis of different quantities of the buildings components (Understand).
32	R20	1	Civil Engineering	R2032015	Remote Sensing and GIS Lab	CO 1	Work comfortably on GIS software (Understand).

						CO 2	Digitize and create thematic map and extract important features (Create).
						CO 3	Develop digital elevation model (Create).
						CO 4	Interpretation and Estimation of features from satellite imagery (Evaluate).
						CO 5	Analyze and Modelling using GIS software (Analyze).
33	R20	1	Civil Engineering	R2032016	Civil Engineering Practice Lab	CO 1	Gain adequate confidence to work as a consulting engineer in any field of Civil Engineering (Understand).
						CO 2	Understand the duties, responsibilities and codal practices of Civil Engineering profession (Understand).
						CO 3	Plan, design and execute Civil Engineering projects (Evaluate, Create).
						CO 4	Build safety related and environmental impact related codal protocols into project planning and execution (Create).
						CO 5	Optimize project costs using sustainability concepts (Evaluate,

							Create).
34	R20	1	Civil Engineering	R2032017	Skill Advanced/Computational Tools - Computer Aided Design Lab	CO 1	Model the geometry of real-world structure Represent the physical model of structural element/structure (Create).
						CO 2	Perform analysis of different structures (Analyze).
						CO 3	Interpret from the Post processing results (Understand).
						CO 4	Design the structural elements and a system as per IS Codes (Evaluate).
						CO 5	Create geometries using pre-processor (Create).
35	R20	1	Civil Engineering	R2032018	Mandatory Course - Employability Skills	CO 1	Solve aptitude and reasoning problems (Analyze).
						CO 2	Apply the soft skills in dealing the issues related to Employability (Apply).
						CO 3	Successful in getting employment in campus placement interview (Create).
						CO 4	Acquire skills required for getting placement (Apply).
						CO 5	Improve personality development and communication skills (Apply).

36	R20	1	Civil Engineering	R204101D	URBAN TRANSPORTATION PLANNING	CO 1	Estimate travel demand for an urban area.
						CO 2	Estimate trip generation, trip distribution, mode choice and traffic assignment.
						CO 3	Plan the transportation network for a city.
						CO 4	Identify the corridor and plan for providing good transportation facilities.
						CO 5	Evaluate various alternative transportation proposals.
37	R20	1	Civil Engineering	R204101E	GROUND IMPROVEMENT TECHNIQUES	CO 1	Understand various methods of ground improvement and their suitability to different field situations.
						CO 2	Design a reinforced earth embankment and check its stability.
						CO 3	Understand the various functions of Geo synthetics and their applications in Civil Engineering practice.
						CO 4	Understand the concepts and applications of grouting.
						CO 5	Design and implement various

							ground improvement techniques on field.
38	R20	1	Civil Engineering	R204101I	DESIGN AND DRAWING OF IRRIGATION STRUCTURES	CO 1	Design and draw hydraulic structures of Surplus weir.
						CO 2	Design and draw hydraulic structures of Tank sluice with a tower head.
						CO 3	Design and draw hydraulic structures of Canal drop-Notch type.
						CO 4	Design and draw hydraulic structures of Canal regulator.
						CO 5	Design and draw hydraulic structures of Syphon aqueduct type III.
39	R20	1	Civil Engineering	R204101O	SURVEYING AND GEOMATICS	CO 1	Describe the function of surveying and work with survey instruments, take observations, and prepare plan, profile, and cross-section and perform calculations.
						CO 2	Calculate, design and layout horizontal and vertical curves.
						CO 3	Operate a total station and GPS to measure distance, angles, and to calculate differences in Elevation. Reduce data for application in a geographic

							information system.
						CO 4	Relate and apply principles of photogrammetry for surveying.
						CO 5	Apply principles of Remote Sensing and Digital Image Processing for Civil Engineering problems.
40	R20	1	Civil Engineering	R204101V	DISASTER MANAGEMENT	CO 1	Affirm the usefulness of integrating management principles in disaster mitigation work.
						CO 2	Distinguish between the different approaches needed to manage pre-during and post-disaster periods.
						CO 3	Explain the process of risk management.
						CO 4	Understand and Relate to risk transfer.
						CO 5	Understand the tools of post-disaster management.
41	R20	1	Civil Engineering	R2041011	UNIVERSAL HUMAN VALUES	CO 1	To appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.

						CO 2	To develop a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
						CO 3	To highlight possible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.
						CO 4	To understand that human beings are not fulfilling to other orders today and need to take appropriate steps to ensure right participation in the nature.
						CO 5	To grasp the right utilization of their knowledge in their streams of Technology/Engineering/ Management/ any other area of study to ensure mutual fulfilment.
42	R20	1	Civil Engineering	R2041013	SKILL ADVANCED COURSE-II	CO 1	Understand the important codes and by-laws that will

					PROJECT AND TOWN PLANNING		benefit young professionals.
						CO 2	Get practical knowledge in planning of smart city.
						CO 3	Gain professional knowledge in the design and construction procedures of various Civil Engineering projects.
						CO 4	Gain Knowledge about the existing cities including roads and metros.
						CO 5	Understand and analyze various governance plans implemented by the government.

S. No	**Regulation**	**Program Code**	**Program Name**	**Course code**	**Course Name**	**CO**	**Course outcome: After the completion of the course student will be able to**
II - I							
1	DR23	4	B.Tech	DR2321T041	Random Variables and Stochastic	CO1	Identify different types of random variables, distributions and their applications
						CO2	Understand the computation of the statistical averages of one random variable
						CO3	Apply the concepts of Multiple random variables to determine the statistical

							averages
						CO4	Analyze the random processes in the time domain
						CO5	Analyze the random processes in the frequency domain and analyze the LTI systems with random inputs
2	DR23	4	B.Tech	DR2321THS1	Universal Human Values–Understanding Harmony and Ethical Human Conduct	CO1	Define the terms like Natural Acceptance, Happiness and Prosperity (L1, L2)
						CO2	Identify one's self, and one's surroundings (family, society nature) (L1, 1.2)
						CO3	Apply what they have learnt to their own self in different day-to-day settings in real life (L3)
						CO4	Relate human values with human relationship and human society. (L4)
						CO5	Justify the need for universal human values and harmonious existence (L5)
3	DR23	4	B.Tech	DR2321T042	Signals and Systems	CO1	Understand the basic concepts of signal and systems and their classification
						CO2	Analyze LTI systems
						CO3	Apply Fourier Analysis like Fourier series and transforms
						CO4	Understand Laplace and Z transforms

						CO5	Analyze Sampling and signal reconstruction
4	DR23	4	B.Tech	DR2321T043	Electronic Devices and Circuits	CO1	The students can understand the basic principles and characteristics of semiconductor devices like Diode, BJT, JFET and MOSFET.
						CO2	The students can able to analyze diode & transistor circuits, various biasing methods, equivalent circuits of transistor amplifiers and their comparison.
						CO3	The students can able to study and analyze various applications such as rectifiers, filters, transistor amplifiers with necessary equivalent circuits.
						CO4	Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions
						CO5	Perform the analysis of small signal low frequency transistor amplifier circuits using BJT and FET in different configurations
5	DR23	4	B.Tech	DR2321T044	Digital Circuits Design	CO1	Understand the properties of Boolean algebra, logic operations, concepts of FSM
						CO2	Apply techniques for minimization of Boolean functions

						CO3	Analyze combinational and Sequential logic circuits
						CO4	Compare various Programmable logic devices
						CO5	Design and Model combinational and sequential circuits using HDLs
II-II							
6	DR23	4	B.Tech	DR2322TMB1	Managerial Economics and Financial Analysis	CO1	Define the concepts related to Managerial Economics, financial accounting and management(L2)
						CO2	Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets (L2)
						CO3	Apply the Concept of Production cost and revenues for effective Business decision (L3)
						CO4	Analyze how to invest their capital and maximize returns (L4)
						CO5	Evaluate the capital budgeting techniques. (L5) and
							Develop the accounting statements and evaluate the financial performance of business entity (L5)
7	DR23	4	B.Tech	DR2322TES4	Linear Control Systems	CO1	1. Summarize the basic principles and applications of control systems. (L2)
						CO2	2. Understand the time response and steady state response of the systems. (L2)

						CO3	3. Understand the concept of state space, controllability and observability. (L2)
						CO4	4. Apply time domain analysis to find solutions to time invariant systems. (L3)
						CO5	5. Analyze different aspects of stability analysis of systems in frequency domain. (L4)
8	DR23	4	B.Tech	DR2322T041	EM Waves and Transmission Lines	CO1	To understand and analyze different laws and theorems of electrostatic fields.
						CO2	To introduce fundamentals of static and time varying electromagnetic fields
						CO3	To analyze the wave concept with the help of Maxwell's equations.
						CO4	To demonstrate the concepts of wave theory and propagation of waves through various mediums.
						CO5	To develop skills in solving various problems related to transmission lines.
9	DR23	4	B.Tech	DR2322T042	Analog Circuits Design	CO1	Learn to design and analyze multistage amplifiers
						CO2	Learn to design and analyze oscillators and will study the characteristics of negative feedback amplifiers
						CO3	Analyze and design Class A,B,AB, C power amplifiers

						CO4	Understand the characteristics of tuned amplifiers
						CO5	Design and analyze wave shaping circuits and multivibrators
10	DR23	4	B.Tech	DR2322T043	Analog and Digital Communications	CO1	Understand the basics of communication system and analog modulation techniques.
						CO2	Apply the basic knowledge of signals and systems and understand the concept of Frequency modulation.
						CO3	Apply the basic knowledge of electronic circuits and understand the effect of Noise in communication system and noise performance of AM and FM systems.
						CO4	Understand TDM and Pulse Modulation techniques
						CO5	Evaluate the performance of digital modulation techniques
11	DR23	4	B.Tech	DR2322LCS4	Soft Skills	CO1	List out various elements of soft skills
						CO2	Describe methods for buiding Professional image
						CO3	Apply critical thinking in problemsolving
						CO4	Analyze the needs of an individual and team for well being
						CO5	Create a productive work place atmosphere using social and work life skills ensuring personal and

							emotional well being
12	DR23	4	B.Tech	DR2322LC01	Design Thinking and Innovation	CO1	Define the concepts related to design thinking
						CO2	Explain the fundamentals of design thinking and innovation
						CO3	Apply the design thinking techniques in solving problems in various sectors
						CO4	Evaluate the value of creativity
						CO5	Formulate specific problem statements of real time issues

S. No	Regulation	Program Code	Program Name	Course code	Course Name	CO	Course outcome: After the completion of the course student will be able to
1	DR24	4	M.Tech(VLSI)	DR24MECT11	CMOS Analog IC Design	CO1	Design MOSFET based analog integrated circuits.
						CO2	Analyze analog circuits at least to the first order.
						CO3	Appreciate the trade-offs involved in analog integrated circuit design
						CO4	Understand and appreciate the importance of noise and distortion in analog circuits.
						CO5	Solve engineering problems for feasible and optimal solutions in the core area of analog ICs
2		4	M.Tech(VLSI)	DR24MECT12	CMOS Digital IC Design	CO1	Demonstrate advanced knowledge in Static and dynamic characteristics of CMOS,

						CO2	Classify different semiconductor memories.
						CO3	Analyze, design and implement combinational and sequential MOS logic circuits.
						CO4	Analyze complex engineering problems critically in the domain of digital IC design for cnducting research
						CO5	Solve engineering problems for feasible and optimal solutions in the core area of digital ICs.
3		4	M.Tech(VLSI)	DR24MECP11	VLSI Technology	CO1	Understand the basics of MOS transistors and also the characteristics of MOS transistors.
						CO2	Learn about the MOS fabrication process and short channel effects
						CO3	Learn about the basic rules in layout designing
						CO4	Analyse various combinational logic networks
						CO5	Learn and analyze about sequential systems
4		4	M.Tech(VLSI)	DR24MECP21	Device Modelling	CO1	To understand the physics of 2-terminal MOSoperation and its characteristics
						CO2	To understand the physics of 4-terminal MOSFEToperation
						CO3	To understand the physics of 4-terminal MOSFEToperational characteristics
						CO4	To learn about small signal analysis of MOSFETs
						CO5	To analyze the SOI MOSFET electrical characteristics

5		4	M.Tech(VLSI)	DR24MCST13	RM and IPR	CO1	Understand research problem formulation.
						CO2	Analyze research related information
						CO3	Follow research ethics
						CO4	Understanding that when IPR would take such important place in growth of individuals
						CO5	Understand that IPR protection provides an incentive to inventors for further research work
6		4	M.Tech(VLSI)	DR24MECL22	CMOS Digital IC design Lab	CO1	Have the ability to explain the VLSI Design Methodologies using Mentor Graphics Tools
						CO2	Grasp the significance of various design logic Circuits in full-custom IC Design.
						CO3	Have the ability to explain the Physical Verification in Layout Extraction
						CO4	Fully Appreciate the design and analyze of CMOS Digital Circuits
						CO5	Grasp the Significance of Pre-Layout Simulation and Post-Layout Simulation
		1st Year 2nd sem					
7		4	M.Tech(VLSI)	DR24MECT21	Mixed Signal & RF IC Design	CO1	Design basic cells like Op-Amp, against process and temperature variations meeting the mixed signal specifications
						CO2	Design comparators that can meet the high speed requirements of digital circuitry.

						CO3	Design a complete mixed signal system that includes efficient data conversion and RF circuits with minimizing switching
						CO4	Understand the design bottlenecks specific to RF IC design, linearity related issues and ISI
						CO5	Comprehend different multiple access techniques, wireless standards and various transceiver architectures
8		4	M.Tech(VLSI)	DR24MECT22	Physical Design Automation	CO1	Understand the relationship between design automation algorithms and Various constraints posed by VLSI fabrication and design technology.
						CO2	Adapt the design algorithms to meet the critical design parameters.
						CO3	Identify layout optimization techniques and map them to the algorithms
						CO4	Develop proto-type EDA tool and test its efficacy
						CO5	Develop design style specific partitioning problems and algorithms
9		4	M.Tech(VLSI)	DR24MECP3A	Design For Testability	CO1	Demonstrate advanced knowledge in The basic faults that occur in digital systems, Testing of stuck at faults for digital circuits, Design for testability.
						CO2	Analyze testing issues in the field of digital system design critically for conducting research.

						CO3	Solve engineering problems by modeling different faults for fault free simulation in digital circuits.
						CO4	Apply appropriate research methodologies and techniques to develop new testing strategies for digital and mixed signal circuits and systems.
						CO5	Illustrate various Routing process and algorithms
10		4	M.Tech(VLSI)	DR24MECP4C	Low power VLSI Design	CO1	Analyze various sources of power dissipation in VLSI circuits, including dynamic and leakage power.
						CO2	Apply voltage scaling techniques and architectural strategies for low power consumption.
						CO3	Evaluate methods for switched capacitance minimization using encoding techniques and clock gating.
						CO4	Examine techniques for leakage power reduction using advanced CMOS fabrication and power gating methods.
						CO5	Perform simulation-based power analysis and assess low power clock distribution techniques.
11		4	M.Tech(VLSI)	DR24MECL21	Mixed Signal & RF IC Design Lab	CO1	Design and simulate fully compensated operational amplifiers using resistor and Miller compensation techniques.
						CO2	Analyze and implement high-speed comparators, including two-stage cross-coupled and strobed flip-flop comparators.
						CO3	Design basic data converters and understand their role in mixed-signal integrated circuits.

						CO4	Implement switched-capacitor circuits, including parasitic-sensitive and parasitic-insensitive integrators.
						CO5	Design and layout advanced analog circuits such as PLLs, VCOs, and bandgap reference circuits using industry-standard tools.
12		4	M.Tech(VLSI)	DR24ECL22	Physical Design Automation	CO1	Apply graph algorithms such as Depth First Search, Breadth First Search, and Dijkstra's algorithm to solve physical design problems in VLSI design automation.
						CO2	Demonstrate the ability to implement computational geometry algorithms like the Line Sweep and Extended Line Sweep methods for efficient layout processing.
						CO3	Analyze and compare various partitioning algorithms including Kernighan–Lin, Fiduccias–Mattheyses, and simulated annealing for optimized circuit partitioning.
						CO4	Design and evaluate floorplanning strategies using constraint-based, integer programming, and hierarchical tree-based approaches.
						CO5	Implement routing algorithms such as Lee's, Soukup's, and Hadlock's algorithms for two-terminal and multi-terminal routing problems.

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1	DR23	4	M.Tech(SSP)	DR23MECT11	Advanced Digital Signal Processing	CO1	Analyze and design digital filters including FIR and IIR using techniques such as impulse invariance, bilinear transformation, and lattice

							structures.
						CO2	Apply FFT algorithms and characterize digital signals in time and frequency domains.
						CO3	Implement multirate DSP concepts like decimation, interpolation, polyphase filters, and filter banks in real-world applications.
						CO4	Design and evaluate adaptive filters using LMS and RLS algorithms for spectral estimation and prediction.
						CO5	Explore applications of DSP in speech, radar, and image processing, and understand wavelet-based processing techniques.
2	DR23	4	M.Tech(SSP)	DR23MECP1A	DSP Architectures	CO1	tudents will be able to differentiate between von Neumann and Harvard architectures and explain the architecture of various TI DSP families including TMS320C1X, C2X, C54x, and C6x.
						CO2	Students will apply core DSP algorithms like FIR, IIR, FFT using processor-specific modules such as MAC units, addressing modes, and on-chip peripherals.
						CO3	Students will gain hands-on experience in assembly and mixed C/assembly programming with tools like Code Composer Studio to build simple DSP-based embedded systems.
						CO4	Students will understand concepts of multi-core processing, OpenMP programming, and develop parallel applications for platforms like TMS320C6678.

						CO5	Students will evaluate limitations of programmable DSPs and apply FPGA-based approaches to develop complete DSP systems, especially for applications like Software Defined Radio (SDR).
3	DR23	4	M.Tech(SSP)	DR23MECT12	Digital Image and Video Processing	CO1	Students will be able to define digital images, understand their representation, and explain the importance of image resolution and applications.
						CO2	Students will gain knowledge of various image transforms (e.g., Fourier, DCT, Haar, KL) and understand their importance in image processing tasks.
						CO3	Students will learn to enhance images using histogram equalization, spatial/frequency filters, and restore degraded images using suitable restoration models.
						CO4	Students will understand image redundancy and apply both lossless and lossy image compression techniques such as Huffman coding and JPEG.
						CO5	Students will be equipped to process video signals, estimate 2D motion, and apply techniques like motion estimation and transform coding in video processing.
4	DR23	4	M.Tech(SSP)	DR23MECP2C	Coding Theory & Applications	CO1	Students will be able to model information mathematically, compute entropy and mutual information, and evaluate different types of errors and error control strategies.
						CO2	Students will learn to construct and analyze linear block codes, compute syndromes, and apply standard array and syndrome decoding techniques for error detection and correction.

						CO3	Students will gain knowledge of encoding and decoding cyclic and convolutional codes, including applications such as Viterbi and sequential decoding.
						CO4	Students will be able to understand and implement burst-error-correcting codes including interleaved and phased-burst cyclic and convolutional codes.
						CO5	Students will acquire the skills to define, encode, and decode BCH codes, including computation of syndromes and use of iterative algorithms for error correction.
5	DR23	4	M.Tech(SSP)	DR23MCST13	Research Methodology & IPR	CO1	Understand the fundamentals of research problems, including identification, scope, and ethical considerations.
						CO2	Apply effective techniques for literature review, plagiarism avoidance, and research ethics.
						CO3	Develop skills in technical writing, report preparation, and research proposal formulation.
						CO4	Gain knowledge about various forms of Intellectual Property Rights (IPR) such as patents, copyrights, trademarks, and their legal frameworks.
						CO5	Analyze the recent developments in IPR and their applications in areas like biotechnology, software, and traditional knowledge systems.
6	DR23	4	M.Tech(SSP)	DR23MECL11	Advanced Digital Signal Processing Lab	CO1	Design and implement various digital filters such as Butterworth, Chebyshev, and IIR filters using simulation software.
						CO2	Apply different transforms (FFT, Z-transform, etc.) in analyzing signals in both time and frequency domains.

						CO3	Perform signal processing techniques like decimation, interpolation, and spectral estimation using appropriate algorithms.
						CO4	Analyze signal properties through autocorrelation, cross-correlation, and power spectral density estimation.
						CO5	Derive and simulate signal system models using state-space methods and stability criteria.
7	DR23	4	M.Tech(SSP)	DR23MECL12	Digital Image and Video Processing Lab	CO1	Students will gain the ability to apply enhancement techniques to improve the visual quality of images and video sequences.
						CO2	Students will be able to implement segmentation algorithms for separating regions or objects in both images and videos.
						CO3	Students will learn to compress images using both lossy and lossless methods to optimize storage and transmission.
						CO4	tudents will be capable of restoring degraded images and extracting both boundary and regional features for image analysis.
						CO5	Students will develop the skills to detect objects in images or videos using template matching or Bayes classifiers.
2nd Semester							
8	DR23	4	M.Tech(SSP)	DR23MECT21	Pattern Recognition &ML	CO1	Study the parametric and linear models for classification.
						CO2	Design neural networks and Support Vector Machines (SVM) for classification.

						CO3	Develop machine-independent and unsupervised learning techniques.
						CO4	Apply statistical techniques and decision theory in pattern recognition problems.
						CO5	Implement and analyze various machine learning algorithms for real-world applications.
9	DR23	4	M.Tech(SSP)	DR23MECT22	Detection &Estimation Theory	CO1	Students will gain a solid understanding of vector spaces, matrix theory, and stochastic processes as they relate to signal detection and estimation.
						CO2	Students will be able to apply classical and Bayesian detection methods, including MAP and entropy detectors, in white and colored Gaussian noise environments.
						CO3	Students will learn to use techniques such as minimum variance estimators, Cramer-Rao bounds, and linear models for accurate parameter estimation.
						CO4	Students will be able to design and apply Wiener and Kalman filters, including their discrete-time and extended forms, for time-varying signal estimation.
						CO5	Students will explore and implement high-resolution spectral estimation methods such as MUSIC, ESPRIT, and DOA estimation in real-world scenarios.
10	DR23	4	M.Tech(SSP)	DR23MECP3A	IOT and Applications	CO1	Students will be able to describe the vision, architecture, infrastructure, and research directions of the Internet of Things.

						CO2	Students will gain knowledge of M2M systems and evaluate IoT architectural frameworks, including design principles and reference models.
						CO3	Students will identify and analyze IoT applications in various domains such as industrial automation, retail, oil and gas, healthcare, and smart homes.
						CO4	Students will understand IoT data flows, energy issues, device connectivity, and the role of standardization.
						CO5	Students will be able to evaluate governance challenges, privacy concerns, and security mechanisms in IoT platforms and smart cities.
11	DR23	4	M.Tech(SSP)	DR23MECP4C	Optical Networks	CO1	Students will comprehend SONET/SDH architecture, WDM elements like OADMs and optical cross-connects, and how they support optical transport.
						CO2	Students will evaluate control and management functions such as fault, performance, and configuration management in optical networks.
						CO3	Students will learn to apply protection mechanisms in SONET/SDH and implement optical layer survivability strategies.
						CO4	Students will gain the ability to address LTD and RWA problems and apply statistical dimensioning in wavelength routing networks.
						CO5	Students will understand optical time division multiplexing and passive optical network architectures like PON, GPON, and AON.

12	DR23	4	M.Tech(SSP)	DR23MECO1A	Business Analytics	CO1	Understand the scope, process, and organizational role of business analytics in gaining competitive advantage.
						CO2	Apply statistical tools, probability distributions, and regression analysis to interpret and model business data.
						CO3	Analyze and implement descriptive, predictive, and prescriptive analytics techniques including data mining and optimization.
						CO4	Utilize forecasting techniques and Monte Carlo simulation for effective business decision-making and risk analysis.
						CO5	Formulate and evaluate decision-making strategies using decision trees, utility theory, and current trends in business intelligence.
13	DR23		M.Tech(SSP)	DR23MECP5C	Artificial Intelligence	CO1	Understand the fundamental concepts of Artificial Intelligence and various search techniques for problem-solving.
						CO2	Apply knowledge representation methods including predicate logic, rules, and semantic networks.
						CO3	Analyze and implement reasoning under uncertainty using Bayesian networks, fuzzy logic, and non-monotonic reasoning.
						CO4	Explore AI techniques in game playing, planning systems, and constraint satisfaction problems.
						CO5	Develop basic understanding of Natural Language Processing (NLP) and neural network-based AI approaches.
14	DR23	4	M.Tech(SSP)	DR23MECL22	Detection &Estimation Theory lab	CO1	Students will gain practical skills in generating and analyzing different types of signals and noise, including spatially separated signals and

							correlated/uncorrelated noise models.
						CO2	Students will learn how to detect constant, time-varying, and unknown signals in the presence of additive white Gaussian noise (AWGN) and colored noise.
						CO3	Students will be able to apply and compare different estimation methods such as Maximum Likelihood Estimation (MLE), Minimum Mean Square Error (MMSE), Bayes Estimator, MAP Estimator, and the Expectation Maximization (EM) algorithm.
						CO4	Students will perform performance comparisons of conventional energy detectors and coherent matched filter techniques, analyzing their relative strengths in different signal conditions.
						CO5	Students will integrate simulation and analytical tools to build and evaluate signal processing systems that operate under real-world noise and signal scenarios.
15	DR23	4	M.Tech(SSP)	DR23MECL21	Pattern Recognition &ML Lab	CO1	Students will be able to design and code basic algorithms such as maximum likelihood estimation, linear regression, and Bayes classifiers.
						CO2	Students will apply the perceptron rule, backpropagation, and delta rule to build and train neural network classifiers.
						CO3	Students will implement deep learning models to solve pattern recognition tasks effectively.
						CO4	Students will develop two-class and multi-class classifiers using Support Vector Machines and assess their performance.

						CO5	Students will gain practical experience in applying unsupervised learning algorithms for clustering and pattern discovery.

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1	DR23	4	M.Tech(SSP)	DR23MECT11	Advanced Digital Signal Processing	CO1	Analyze and design digital filters including FIR and IIR using techniques such as impulse invariance, bilinear transformation, and lattice structures.
						CO2	Apply FFT algorithms and characterize digital signals in time and frequency domains.
						CO3	Implement multirate DSP concepts like decimation, interpolation, polyphase filters, and filter banks in real-world applications.
						CO4	Design and evaluate adaptive filters using LMS and RLS algorithms for spectral estimation and prediction.
						CO5	Explore applications of DSP in speech, radar, and image processing, and understand wavelet-based processing techniques.
2	DR23	4	M.Tech(SSP)	DR23MECP1A	DSP Architectures	CO1	tudents will be able to differentiate between von Neumann and Harvard architectures and explain the architecture of various TI DSP families including TMS320C1X, C2X, C54x, and C6x.
						CO2	Students will apply core DSP algorithms like FIR, IIR, FFT using processor-specific modules such as MAC units, addressing modes, and on-chip peripherals.
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							simple DSP-based embedded systems.
						CO4	Students will understand concepts of multi-core processing, OpenMP programming, and develop parallel applications for platforms like TMS320C6678.
						CO5	Students will evaluate limitations of programmable DSPs and apply FPGA-based approaches to develop complete DSP systems, especially for applications like Software Defined Radio (SDR).
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						CO2	Students will learn to construct and analyze linear block codes, compute syndromes, and apply standard array and syndrome decoding techniques for error detection and correction.
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5	DR23	4	M.Tech(SSP)	DR23MCST13	Research Methodology & IPR	CO1	Understand the fundamentals of research problems, including identification, scope, and ethical considerations.
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6	DR23	4	M.Tech(SSP)	DR23MECL11	Advanced Digital Signal Processing	CO1	Design and implement various digital filters such as Butterworth, Chebyshev, and IIR filters using simulation software.

					Lab	CO2	Apply different transforms (FFT, Z-transform, etc.) in analyzing signals in both time and frequency domains.
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						CO2	Students will be able to implement segmentation algorithms for separating regions or objects in both images and videos.
						CO3	Students will learn to compress images using both lossy and lossless methods to optimize storage and transmission.
						CO4	tudents will be capable of restoring degraded images and extracting both boundary and regional features for image analysis.
						CO5	Students will develop the skills to detect objects in images or videos using template matching or Bayes classifiers.
2nd Semester							
8	DR23	4	M.Tech(SSP)	DR23MECT21	Pattern Recognition &ML	CO1	Study the parametric and linear models for classification.
						CO2	Design neural networks and Support Vector Machines (SVM) for classification.
						CO3	Develop machine-independent and unsupervised learning techniques.
						CO4	Apply statistical techniques and decision theory in pattern recognition problems.
						CO5	Implement and analyze various machine learning algorithms for real-world applications.
9	DR23	4	M.Tech(SSP)	DR23MECT22	Detection &Estimation Theory	CO1	Students will gain a solid understanding of vector spaces, matrix theory, and stochastic

							processes as they relate to signal detection and estimation.
						CO2	Students will be able to apply classical and Bayesian detection methods, including MAP and entropy detectors, in white and colored Gaussian noise environments.
						CO3	Students will learn to use techniques such as minimum variance estimators, Cramer-Rao bounds, and linear models for accurate parameter estimation.
						CO4	Students will be able to design and apply Wiener and Kalman filters, including their discrete-time and extended forms, for time-varying signal estimation.
						CO5	Students will explore and implement high-resolution spectral estimation methods such as MUSIC, ESPRIT, and DOA estimation in real-world scenarios.
10	DR23	4	M.Tech(SSP)	DR23MECP3A	IOT and Applications	CO1	Students will be able to describe the vision, architecture, infrastructure, and research directions of the Internet of Things.
						CO2	Students will gain knowledge of M2M systems and evaluate IoT architectural frameworks, including design principles and reference models.
						CO3	Students will identify and analyze IoT applications in various domains such as industrial automation, retail, oil and gas, healthcare, and smart homes.
						CO4	Students will understand IoT data flows, energy issues, device connectivity, and the role of standardization.

						CO5	Students will be able to evaluate governance challenges, privacy concerns, and security mechanisms in IoT platforms and smart cities.
11	DR23	4	M.Tech(SSP)	DR23MECP4C	Optical Networks	CO1	Students will comprehend SONET/SDH architecture, WDM elements like OADMs and optical cross-connects, and how they support optical transport.
						CO2	Students will evaluate control and management functions such as fault, performance, and configuration management in optical networks.
						CO3	Students will learn to apply protection mechanisms in SONET/SDH and implement optical layer survivability strategies.
						CO4	Students will gain the ability to address LTD and RWA problems and apply statistical dimensioning in wavelength routing networks.
						CO5	Students will understand optical time division multiplexing and passive optical network architectures like PON, GPON, and AON.
12	DR23	4	M.Tech(SSP)	DR23MECO1A	Business Analytics	CO1	Understand the scope, process, and organizational role of business analytics in gaining competitive advantage.
						CO2	Apply statistical tools, probability distributions, and regression analysis to interpret and model business data.
						CO3	Analyze and implement descriptive, predictive, and prescriptive analytics techniques including data mining and optimization.

						CO4	Utilize forecasting techniques and Monte Carlo simulation for effective business decision-making and risk analysis.
						CO5	Formulate and evaluate decision-making strategies using decision trees, utility theory, and current trends in business intelligence.
13	DR23		M.Tech(SSP)	DR23MECP5C	Artificial Intelligence	CO1	Understand the fundamental concepts of Artificial Intelligence and various search techniques for problem-solving.
						CO2	Apply knowledge representation methods including predicate logic, rules, and semantic networks.
						CO3	Analyze and implement reasoning under uncertainty using Bayesian networks, fuzzy logic, and non-monotonic reasoning.
						CO4	Explore AI techniques in game playing, planning systems, and constraint satisfaction problems.
						CO5	Develop basic understanding of Natural Language Processing (NLP) and neural network-based AI approaches.
14	DR23	4	M.Tech(SSP)	DR23MECL22	Detection &Estimation Theory lab	CO1	Students will gain practical skills in generating and analyzing different types of signals and noise, including spatially separated signals and correlated/uncorrelated noise models.
						CO2	Students will learn how to detect constant, time-varying, and unknown signals in the presence of additive white Gaussian noise (AWGN) and colored noise.
						CO3	Students will be able to apply and compare different estimation methods such as Maximum Likelihood Estimation (MLE), Minimum Mean Square Error

							(MMSE), Bayes Estimator, MAP Estimator, and the Expectation Maximization (EM) algorithm.
						CO4	Students will perform performance comparisons of conventional energy detectors and coherent matched filter techniques, analyzing their relative strengths in different signal conditions.
						CO5	Students will integrate simulation and analytical tools to build and evaluate signal processing systems that operate under real-world noise and signal scenarios.
15	DR23	4	M.Tech(SSP)	DR23MECL21	Pattern Recognition &ML Lab	CO1	Students will be able to design and code basic algorithms such as maximum likelihood estimation, linear regression, and Bayes classifiers.
						CO2	Students will apply the perceptron rule, backpropagation, and delta rule to build and train neural network classifiers.
						CO3	Students will implement deep learning models to solve pattern recognition tasks effectively.
						CO4	Students will develop two-class and multi-class classifiers using Support Vector Machines and assess their performance.
						CO5	Students will gain practical experience in applying unsupervised learning algorithms for clustering and pattern discovery.

II-I

DADI INSTITUTE OF ENGINEERING &TECHNOLOGY

An Autonomous Institute
Approved by A.I.C.T.E & Permanently Affiliated to JNTU GV
Accredited by NAAC with 'A' Grade and Inclusion u/s 2(f) & 12(B) of UGC Act
An ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018 Certified Institute.
NH-16, Anakapalle – 531002, Visakhapatnam, A.P.
www.diet.edu.in, 9963993229, E-mail: principal@diet.edu.in

S. No	Regulation	Program Code	Program Name	Course code	Course Name	CO	Course outcome: After the completion of the course student will be able to
1	DR23	4	B.Tech	DR2321L045	Electronic Devices and Circuits Lab	CO1	The theoretical concepts shall be verified by conducting experiment using hardware
						CO2	Analyze the characteristics of Diodes, Rectifiers, BJT, FET by conducting experiments
						CO3	Analyse the applications of Diodes,Transisters
						CO4	Design an amplifier circuit using specifications and obtain the performance parameters using hardware equipment
						CO5	Simulate the electronic circuits using EDA tools like PSPICE/Multisim or equivalent
2	DR23	4	B.Tech	DR2321L046	Digital Design & Signal Simulation lab	CO1	Design and verify the functionality of various combinational logic circuits using HDL
						CO2	Design and verify the functionality of various sequential logic circuits using HDL.
						CO3	Understand how to simulate different types of signals and system response
						CO4	
						CO5	Analyze the response of different systems when they are excited by different signals
							Generate different random signals for the given specifications and plot power spectral density of signals.

3	DR23	4	B.Tech	DR2321LC04	PCB Design and prototype Design	CO1	PCB design, including components, layers, traces, and the electrical principles that guide PCB layouts.
						CO2	Schematic Capture and PCB Layout
						CO3	PCB manufacturing process, including etching, drilling, and soldering.
						CO4	Signal Integrity and Power Distribution
						CO5	Industry Standards and Best Practices
II-II							
4	DR23	4	B.Tech	DR2322L044	Analog Circuits Design Lab	CO1	Design and analyze multi stage amplifiers
						CO2	Design and analyze negative feedback amplifiers
						CO3	Design and analyze oscillators
						CO4	Design and analyze power amplifiers
						CO5	Design and analyze Multivibrators
5	DR23	4	B.Tech	DR2322L045	Analog and Digital Communications	CO1	Know about the usage of equipment and tools used to conduct experiments in analog and digital modulation techniques

						CO2	Analyze and compare different modulation schemes like AM and FM for their effeciency
						CO3	Analyze the behaviour of communication received system module
						CO4	Analyze pulsed modulation systems and their performance
						CO5	Analyze different digital modulation schemes,digital reveiver system module

S. No	Regulation	Program Code	Program Name	Course code	Course Name	CO	Course outcome: After the completion of the course student will be able to
1	R20	4	B.Tech	R2021043	Signal And Systems	CO1	To study about signals andsystems.
						CO2	To analyze the spectral characteristics of signal using Fourier series and Fouriertransforms.
						CO3	To understand the characteristics ofsystems.To understand the characteristics ofsystems.
						CO4	To introduce the concept of samplingprocess
						CO5	To know various transform techniques(Laplace and z) to analyze the signals andsystems.
	R20	4	B.Tech	R2021041	Electronic Devices And Circuits	CO1	Understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modes of operation

						CO2	Know the construction, working principle of rectifiers with and without filters with relevant expressions and necessary comparisons
						CO3	Understand the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations
						CO4	Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions
						CO5	Perform the analysis of small signal low frequency transistor amplifier circuits using BJT and FET in different configurations
	R20	4	B.Tech	R2021042	Switching Theory And Logic Design	CO1	Classify different number systems and apply to generate various codes
						CO2	Use the concept of Boolean algebra in minimization of switching functions
						CO3	Design different types of combinational logic circuits.
						CO4	Apply knowledge of flip-flops in designing of Registers and counters
						CO5	The operation and design methodology for synchronous sequential circuits and algorithmic state machines
	R20	4	B.Tech	R2021044	Random Variables & Stochastic	CO1	Identify different types of random variables, distributions and their applications.

					Processes	CO2	2. Understand the computation of the statistical averages of one random variable.
						CO3	3. Apply the concepts of Multiple random variables to determine the statistical averages
						CO4	4. Analyze the random processes in the time domain
						CO5	5. Analyze the random processes in the frequency domain and analyze the LTI systems with random inputs.
	R20	4	B.Tech	R2021011	M-III	CO1	Interpret the physical meaning of different operators such as gradient, curland divergence (L5)
						CO2	Estimate the work done against a field, circulation and fluxusing vector calculus (L5) .
						CO3	Apply the Laplace transform for solving differential equations (L3)
						CO4	Find or compute the Fourier series of periodic signals (L3)
						CO5	Knowandbeable to apply integral expressions for the forwards and inverse Fourier
II-II							
	R20	4	B.Tech	R2022041	Electronic Circuit Analysis	CO1	Design and analysis of small signal high frequency transistor amplifier using BJT and FET
						CO2	Design and analysis of multistage amplifiers using BJT and FET and Differential

							amplifier using BJT
						CO3	Design and analysis of feedback amplifiers and their performance analysis
						CO4	Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept.
						CO5	Know the classification of the power and tuned amplifiers and their analysis with performance comparison
	R20	4	B.Tech	R2022043	Analog Communications	CO1	Learn basic concepts of modulation.Generation and Detection of AM,FM
						CO2	Apply the principles of AM to Analyze DSBSC,SSB,VSB
						CO3	Analyze FM and PM
						CO4	Design the Transmitters and Receivers
						CO5	Classify and compherend the working principle PAM,PPM,PWM and Analyze Noise performances in AM,FM Receivers
	R20	4	B.Tech	R2022042	Digital IC Design	CO1	Understand the structure of commercially available digital integrated circuit families.
						CO2	Learn the IEEE Standard 1076 Hardware Description Language (VHDL).

						CO3	.Model complex digital systems at several levels of abstractions, behavioral, structural, simulation, synthesis and rapid system prototyping.
						CO4	Analyze and design basic digital circuits with combinatorial logic circuits using VHDL.
						CO5	Analyze and design basic digital circuits with sequential logic circuits using VHDL.
	R20	4	B.Tech	R2022044	Linear control Systems	CO1	Derive the transfer function of physical systems and determination of overall transfer function using block diagram algebra and signal flow graphs.
						CO2	Determine time response specifications of second order systems and absolute and relative stability of LTI systems using Routh's stability criterion and the root locus method.
						CO3	Analyze the stability of LTI systems using frequency response methods.
						CO4	Design Lag, Lead, Lag-Lead compensators to improve system performance from Bode diagrams.
						CO5	Represent physical systems as state models and determine the response. Understanding the concepts of controllability and observability
	R20	4	B.Tech	R2022045	Management and Organizational Behavior	CO1	To familiarize with the process of management, principles, leadership styles and basic concepts on Organisation.

						CO2	To know how to apply basic knowledge of statistics in quality control and to study about the inventory management.
						CO3	To provide conceptual knowledge on functional management that is on Human resource management and Marketing management.
						CO4	To provide basic insight into Strategic Management and corporate planning with SWOT analysis.
						CO5	To know about the contemporary management practices in the globalised era
III-I							
	R20	4	B.Tech	R2031041	Analaog IC Applications	CO1	Analyze the Characteristics of OPAMP
						CO2	Analyze and Design of linear and nonlinear applications of OPAMP
						CO3	Analyze and Design of Active filters
						CO4	Analyze and Design of Multivibrators using 555 timer and applications of PLL
						CO5	Classify and compherend the working principle of Data converters
	R20	4	B.Tech	R2031042	Electromagnetic Waves and Transmission Lines	CO1	Determine E and H using various laws and applications of electric & magnetic fields
						CO2	Apply the Maxwell equations to analyze the time varying behavior of EM waves

						CO3	Gain the knowledge in uniform plane wave concept and characteristics of uniform plane wave in various media
						CO4	Gain the knowledge in uniform plane wave concept and characteristics of uniform plane wave in various media
						CO5	Derive and Calculate the expressions for input impedance of transmission lines, reflection coefficient, VSWR etc. using smith chart
	R20	4	B.Tech	R2031043	Digital Communications	CO1	Understand the basic conept of digital communication system.
						CO2	Demonstrate the different modulation and detection methods of different digital modulation techniques
						CO3	Analyze the performance of a Digital Communication System for probability of error
						CO4	Understand the concept of entropy and its types and mutual information.
						CO5	Describe the different channel coding techniques
	R20	4	B.Tech	R203104C	Computer Architecture & Organization	CO1	Students can understand the architecture of modern computer.
						CO2	They can analyze the Performance of a computer using performance equation
						CO3	Understanding of different instruction types.
						CO4	Students can calculate the effective address of an operand by addressing modes

						CO5	They can understand how computer stores positive and negative numbers.
							Understand the concepts of I/O Organization and Memory systems.
	R20	4	B.Tech	R203105L	Operating Systems	**CO1**	Describe Computer Operating System Functions, Structures and System Calls
						CO2	Demonstrate various Process Management Concepts and CPU Scheduling Algorithms and Process Synchronization Techniques
						CO3	Illustrate Memory Management Techniques and Page Replacement Algorithms.
						CO4	Apply Deadlock Prevention and Avoidance Techniques
						CO5	Demonstrate File System Concepts and Mass Storage Structures
	R20	4	B.Tech	R2031047	Indian Traditional Knowledge	**CO1**	Understand the concept of Traditional knowledge and its importance
						CO2	Know the need and importance of protecting traditional knowledge
						CO3	Know the various enactments related to the protection of traditional knowledge
						CO4	Understand the concepts of Intellectual property to protect the traditional knowledge
						CO5	**Appreciate the importance of traditional knowledge in various sector**

III-II							
	R20	4	B.Tech	R2032043	Digital Signal Processing	CO1	Apply the difference equations concept in the analysis of Discrete time systems
						CO2	Use the FFT algorithm for solving the DFT of a given signal
						CO3	Design a Digital filter (FIR&IIR) from the given specifications
						CO4	Realize the FIR and IIR structures from the designed digital filter.
						CO5	Realize the FIR and IIR structures from the designed digital filter.
	R20	4	B.Tech	R2032041	Microprocessors and Microcontrollers	CO1	Develop the assembly language programs for different addressing modes. ii
						CO2	Perform 8086 interfacing with different peripherals and implement programs.
						CO3	Describe the key features serial and parallel communication.
						CO4	Design Microcontroller for simple Applications.
						CO5	Distinguish between architectures of various processors and controllers
	R20	4	B.Tech	R203204B	Mobile & Cellular Communication	CO1	Understand the concept of entropy and its types and mutual information.
						CO2	Examine different frequency management and channel assignment techniques

						CO3	Understand co channel interference and examine various handoff mechanisms
						CO4	Analyze radio channel characteristics in different propogation environments
						CO5	Examine different Multiple Access techniques
	R20	4	B.Tech	R203205F	Python Programming	CO1	Develop algorithmic solutions to simple computational problems
						CO2	Read, write, execute by hand simple Python programs.
						CO3	Decompose a Python program into functions.
						CO4	Represent compound data using Python lists, tuples, dictionaries.
						CO5	Read and write data from/to files in Python Programs
	R20	4	B.Tech	R2032042	VLSI Design	CO1	Demonstrate a clear understanding of CMOS fabrication flow and technology scaling
						CO2	Apply the design Rules and draw layout of a given logic circuit
						CO3	Design basic building blocks in Analog IC design & Analyze the behavior of amplifier circuits with various loads
						CO4	Design various CMOS logic circuits for design of Combinational logic circuits

						CO5	. Design various applications using FPGA
	R20	4	B.Tech	R2032048	Research Methodology	CO1	Exploratory, Descriptive, and Explanatory Research
						CO2	Interviews (Structured, Semi-Structured, Unstructured)
						CO3	Probability Sampling (e.g., Random, Stratified, Systematic)
						CO4	Confidentiality and Anonymity
						CO5	
IV-I							
	R20	4	B.Tech	R204104A	Optical Communication	CO1	Choose necessary components required in modern optical communications systems .
						CO2	Design and build optical fiber experiments in the laboratory, and learn how to calculate electromagnetic modes in waveguides, the amount of light lost going through an optical system, dispersion of optical fibers.
						CO3	Use different types of photo detectors and optical test equipment to analyze optical fiber and light wave systems.

						CO4	Choose the optical cables for better communication with minimum losses
						CO5	Design, build, and demonstrate optical fiber experiments in the laboratory
	R20	4	B.Tech	R204104D	Satellite Communications	CO1	Understand the concepts, applications and subsystems of Satellite communications.
						CO2	2. Derive the expression for G/T ratio and to solve some analytical problems on satellite link design.
						CO3	3. Understand the various types of multiple access techniques and architecture of earth station design.
						CO4	4. Understand the concepts of GPS and its architecture
						CO5	
	R20	4	B.Tech	R204104I	Internet of Things	**CO1**	Understand IoT Architecture and Design Principles: Gain knowledge of IoT architectural overview, design principles, networking basics, and the role of cloud and security aspects in IoT.
						CO2	Develop an understanding of various IoT hardware components such as Arduino, Raspberry Pi, and ARM Cortex processors, including their architecture and instruction sets.
						CO3	Acquire skills in IoT application development using communication protocols (MQTT, ZigBee, CoAP) and software programming APIs

							with languages like Python, Node.js, and Arduino.
						CO4	Learn to integrate devices, acquire and manage data, store device data on cloud/local servers, and implement device authentication and authorization.
						CO5	Apply IoT concepts to real-world applications in industrial automation, transportation, agriculture, healthcare, and home automation, while understanding the challenges of cloud integration with IoT.
	R20	4	B.Tech	R204104X	Remote Sensing & GIS	**CO1**	Be familiar with ground, air and satellite based sensor platforms.
						CO2	Interpret the aerial photographs and satellite imageries
						CO3	Create and input spatial data for GIS application
						CO4	Apply RS and GIS concepts in water resources engineering
						CO5	Applications of various GIS
	R20	4	B.Tech	R204105O	Image Processing	CO1	Perform image manipulations and different digital image processing techniques
						CO2	Perform basic operations like – Enhancement, segmentation, compression, Image transforms and restoration techniques on ima

						CO3	Analyze pseudo and full color image processing techniques.
						CO4	Apply various morphological operators on images
						CO5	Learn different feature extraction techniques for image analysis and recognition
	R20	4	B.Tech	R2041011	UHV	CO1	To Development of a holistic perspective based on self-exploration about themselves(human being), family, society and nature/existence.
						CO2	To Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
						CO3	Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
						CO4	. To Strengthening of self-reflection. v
						CO5	. To Development of commitment and courage to act

S. No	Regulation	Program Code	Program Name	Course code	Course Name	CO	Course outcome: After the completion of the course student will be able to

1	R20	4	B.Tech	R2021045	OOPS through Java Lab	CO1	Identify classes, objects, members of a class and the relationship amongthemneeded for aspecificproblem
						CO2	Implement programs to distinguish differentf orms of inheritance
						CO3	Create packages and to reuse them
						CO4	Developprogramsusing Exception Handling mechanism
						CO5	Developmultithreaded applicationusing synchronization concept.
2	R20	4	B.Tech	R2021046	Electronic Devices and Circuits -Lab	CO1	Understand the Diode,Zener Diode and Transistor,SCR,UJT characteristics.
						CO2	Verify the rectifier circuits using diodes and implement them using hardware.
						CO3	Design various amplifiers like CE, CC, common source amplifiers and implement them using hardware and also observe their frequency responses
						CO4	Design the biasing circuits like self biasing.
						CO5	Understand the construction, operation and characteristics of JFET and MOSFET, which can be used in the design of amplifiers
3	R20	4	B.Tech	R2021047	Switching Theory and Logic Design– Lab	CO1	Describe and explain the operation of fundamental digital gates
						CO2	Analyze the operation of medium complexity standard combinational circuits like the encoder, decoder, multiplexer, demultiplexer, adder .
						CO3	Analyze the operation of a flip-flop and examine relevant timing diagrams
						CO4	Analyze the operation of counters and shift registers

						CO5	Design operate practical digital logic circuits
3	R20	4	B.Tech	R2021048	Python Programming	CO1	Know comprehensions, generators in python.
						CO2	Know exception handling in python
						CO3	Know file I/O
						CO4	Understand various data types like lists, tuples, strings etc
						CO5	Know the usage of various pre-defined functions on the above data types
II-II							
4	R20	4	B.Tech	R2022046	Electronic Circuit Analysis Lab	CO1	Design and analyze the basic operations of MOSFET
						CO2	Know about the multistage amplifier using BJT in various configuration to determine frequency response and concept of voltage gain
						CO3	Know about different power amplifier circuits, their design and use in electronics and communication circuits.
						CO4	Know the concept of feedback amplifier and their characteristics
						CO5	Design the different oscillator circuits for various frequencies
5	R20	4	B.Tech	R2022047	Analog Communications Lab	CO1	Able to identify and describe different analog modulation techniques.
						CO2	Learn the concept of sampling and Quantization
						CO3	Learn to demonstrate generation and detection of pulse modulation
						CO4	Design a preemphasis and deemphasis circuit
						CO5	Able to analyze AM radio receiver

6	R20	4	B.Tech	R2022048	Digital IC Design Lab	CO1	Understand the structure of commercially available digital integrated circuit families.
						CO2	Learn the IEEE Standard 1076 Hardware Description Language (VHDL).
						CO3	.Model complex digital systems at several levels of abstractions, behavioral, structural, simulation, synthesis and rapid system prototyping.
						CO4	Analyze and design basic digital circuits with combinatorial logic circuits using VHDL.
						CO5	Analyze and design basic digital circuits with sequential logic circuits using VHDL.
7	R20	4	B.Tech	R2022049	Soft Skills	CO1	Use language fluently, accurately and appropriately indebates and group discussions
						CO2	Use their skills of listening comprehension to communicate effectively incross-cultural contexts..
						CO3	Learn and use new vocabulary.
						CO4	Write resumes,project reports and reviews.
						CO5	Exhibit interview skills and develop soft skills
III-I							
8	R20	4	B.Tech	R2031044	Analog ICs and Applications LAB	CO1	Students will have a thorough understanding of operational amplifier(741)
						CO2	Design circuits using operational amplifiers for various applications.
						CO3	Design and analyze various Active butterworth Filters
						CO4	Design and analyze various waveshaping circuits

						CO5	Design the applications using PLL
9	R20	4	B.Tech	R2031045	Digital Communications Lab	CO1	Understand and implement digital modulation techniques
						CO2	Apply error detection and correction codes for reliable communication
						CO3	Explore multiplexing techniques to improve bandwidth utilization
						CO4	Understand and implement source encoding and companding techniques
						CO5	Analyze and compare digital signal processing techniques in communication systems
10	R20	4	B.Tech	R2031046	Data Structures using Java Lab	CO1	Ability to select the data structures that efficiently model the information in a problem
						CO2	Ability to assess efficiency trade-offs among different data structure implementations orcombinations.
						CO3	Implement and know the application of algorithms for sorting and pattern matching
						CO4	Design programs using a variety of data structures, including hash tables, binary and generaltree structures, search trees, tries, heaps, graphs, and B-trees.
						CO5	Design and analysis of text processing algorithms
III-II							
11	R20	4	B.Tech	R2032044	Microprocessor and Microcontrollers - Lab	CO1	Demonstrate proficiency in 8086 assembly language programming
						CO2	Develop and implement interfacing techniques for 8086 microprocessor
						CO3	Apply 8051 microcontroller for solving real-time embedded problems

						CO4	Understand and verify the use of timers, counters, and UART operations in 8051
						CO5	Develop ARM Cortex M3-based embedded solutions using assembly and C programming
12	R20	4	B.Tech	R2032045	VLSI Design Lab	CO1	Understand the physical design of digital integrated circuits
						CO2	Describe procedure for designing of programmable circuits
						CO3	Demonstrate the ability to use various EDA tool for digital system design
						CO4	Implement various combinational and sequential circuits using VHDL on FPGA.
						CO5	To analyze the result of logic and timing simulations and to use these simulation results to debug digital system.
13	R20	4	B.Tech	R2032047	ARM based/ Aurdino based Programming	CO1	Comprehend Microcontroller-Transducers Interface techniques
						CO2	Establish Serial Communication link with Arduino
						CO3	Analyze basics of SPI interface.
						CO4	Interface Stepper Motor with Arduino
						CO5	Analyze Accelerometer interface techniques
14	R20	4	B.Tech	R2032046	Digital Signal Processing Lab	CO1	Understand the concepts of Linear Convolution and Circular Convolution concepts using MATLAB
						CO2	Explore the concepts of Computation of Discrete Fourier Transform(DFT) and Inverse Discrete Fourier Transform (IDFT)
						CO3	Develop the design procedures for FIR Filters

						CO4	Develop the design procedures for IIR Filters
						CO5	Analyze transfer function stability pole-zero plot, bode Plot and Nyquist plot.
IV-I							
15	R20	4	B.Tech	R204104Z	Designer Tools	CO1	Students will be able to design dipole antenna
						CO2	Students will be able to design misrostripped patch antenna
						CO3	Students will be able to implement FPGA based projects
						CO4	Students will be able to complete miniprojects
						CO5	Students will be able to perform schematic and layout design

Department of Electrical & Electronics Engineering

S.No	Regulation	Program Code	Program Name	Course code	Course Name	CO	Course outcome: After the completion of the course student will be able to
1	DR23	2	EEE	**DR23 EST04**	**Basic Electrical & Electronics Engineering**	CO1	Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments.
						CO2	Understand the problem solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations.
						CO3	Apply mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems.

						CO4	Analyze different electrical circuits, performance of machines and measuring instruments.
						CO5	Evaluate different circuit configurations, Machine performance and Power systems operation.
2	DR23	2	EEE	**DR23 ESL05**	**Electrical & Electronics Engineering Workshop**	CO1 CO2 CO3 CO4 CO5 CO6	Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer.
							Apply the theoretical concepts and operating principles to derive mathematical models for
							circuits, Elect virical machines and resistance, power and power factor measuring instruments; calculations for the measurement of
							Apply the theoretical concepts to obtain calculations for the measurement of resistance,power and power factor.
							Analyse various characteristics of electrical circuits, electrical machines instruments and measuring
							Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring.
3	DR23	2	EEE	**DR23 EET02**	**Electrical Circuit Analysis-I**	CO1	Rememberingthebasicelectricalelementsanddifferentfundamentallaws.
						CO2	Understandthenetworkreductiontechniques,transformations,conceptofself-inductanceandmutualinductance,phasordiagrams,resonanceandnetworktheorems.
						CO3	Applytheconceptstoobtainvariousmathematicalandgraphicalrepresentations.
						CO4	Analysenodalandmeshnetworks,seriesandparallelcircuits,steadystateresponse,differentcircuittopologies(withR,Land Ccomponents).
						CO5	EvaluationofNetworktheorems,electrical,magneticandsingle-phasecircuits.

4	DR23	2	EEE	**DR23 EEL02**	**Electrical Circuits Lab**	CO1	Understandtheconceptsofnetworktheorems,nodeandmeshnetworks,seriesandparallelresonanceandLocusdiagrams.
						CO2	Applyvarioustheoremstocomparepracticalresultsobtainedwiththeoreticalcalculations.
						CO3	Determine self, mutual inductances and coefficient of coupling values, parameters ofchokecoil.
						CO4	Analysedifferentcircuitcharacteristicswiththehelpoffundamentallawsandvariousconfigurations.
						CO5	CreatelocusdiagramsofRL,RCseriescircuitsandexamineseriesandparallelresonance.
5	DR23	2	EEE	**(DR23 EET03)**	**NETWORKANALYSIS**	CO1	Understand basic electrical circuits with nodal and mesh analysis.
						CO2	Analysethecircuitusingnetworksimplificationtheorems.
						CO3	Find Transient response and Steady state response of a network.
						CO4	AnalyseelectricalnetworksintheLaplacedomain.
						CO5	Computetheparametersofatwo-portnetwork
6	DR23	2	EEE	**DR23 MCT01**	**Universal Human Values-Understanding Harmony**	CO1 CO2 CO3 CO4 CO5 CO6	Define thetermslikeNaturalAcceptance, HappinessandProsperity(L1,L2)
							Identifyone'sself,and one'ssurroundings(family,societynature)(L1,L2)
							Apply what they have learnt to their own self in different day-to-day settings in real life (L3)

							Relatehumanvalueswithhumanrelationshipand humansociety.(L4)
							Justifytheneedforuniversalhumanvaluesandharmoniouse xistence(L5)
							Developassociallyandecologicallyresponsibleengineers(L3,L6)
7	DR23	2	EEE	**DR23 EST05**	**Electromagnetic Field Theory**	CO1	Computeelectric fields and potentials usingGausslaw/solve Laplace's or Poisson's equations for various electric charge distributions.
						CO2	Analyse the behaviour ofconductorsinelectric fields, electric diploe and the capacitance and energy stored in dielectrics.
						CO3	Calculate the magnetic field intensity due to current carrying conductor and understanding the application of Ampere's law, Maxwell's second and third law magnetic force and Equations
						CO4	Estimateselfandmutualinductancesandtheenergystoredint hemagneticfield.
						CO5	Understand the concepts of Faraday's laws, Displacement current, Poynting theorem and Poynting vector.
8	DR23	2	EEE	**DR23 PCT01**	**Electrical Circuit Analysis-II**	CO1	Analyse thebalanced and unbalanced 3 phase circuits for power calculations.
						CO2	Analyse the transient behaviour of electrical networks in different domains.
						CO3	EstimatevariousNetworkparameters.
						CO4	Applythe concept ofFourier seriesto electrical systems.
						CO5	Analyse the filter circuit for electrical circuits.

9	DR23	2	EEE	**DR23PCT02**	**DC Machines & Transformers**	CO1	Understandtheprocessofvoltagebuild-upinDCgeneratorsandcharacteristics.
						CO2	Understand the process oftorque production, starting and speed control ofDC motors and illustrate their characteristics.
						CO3	Obtaintheequivalentcircuitofsingle-phasetransformeranddetermineitsefficiency & regulation.
						CO4	Analyze the performace of Single- Phase Transformers
						CO5	Analyse variousconfigurations ofthree-phase transformers.
10	DR23	2	EEE	**DR23PCL01**	**Electrical Circuit Analysis-II and Simulation Lab**	CO1	Understand the powercalculations inthree phase circuits.
						CO2	Evaluate the time response of given network.
						CO3	Evaluatetwoportnetworkparameters.
						CO4	Simulate andanalyse electricalcircuitsusingsuitablesoftware.
11	DR23	2	EEE	**DR23PCL02**	**DC Machines & Transformers Lab**	CO1	DemonstratestartingandspeedcontrolmethodsofDCMachines.
						CO2	Applytheoretical concepts inanalysingtheperformance characteristics ofDC Machines.
						CO3	Determine the performance characteristics of DCmachinesusing different testing methods.
						CO4	Determinethe performanceparameters ofsingle-phasetransformer.

12	DR23	2	EEE	**DR23 ACC01**	**Environmental Science**	CO1 CO2 CO3 CO4 CO5	NO CREIDTS
13	DR23	2	EEE	**DR23 PCT03**	**Power Systems-I**	CO1 CO2 CO3 CO4 CO5	Understand thedifferent typesofpower plants, operationof hydroelectric and thermal power plants. UnderstandtheoperationofNuclearpowerplants. Describethedifferentcomponentsofairandgasinsulatedsubstations. Discusstheconstruction ofsinglecore andthreecorecablesanddescribedistribution systemconfigurations. Analysedifferenteconomicfactorsofpowergenerationandtariffs.
14	DR23	2	EEE	**DR23 PCT04**	**Induction and Synchronous Machines**	CO1 CO2 CO3	Explainthe construction and operationofthree-phase induction motor. Analyse the performance of three-phase induction motor. Describe the working of single-phase inductionmotors.

						CO4	Analyse the performance of Synchronous generators
						CO5	Analyse the performance of Synchronous motors
15	DR23	2	EEE	**DR23 PCT05**	**Control Systems**	CO1	Derive the transferfunction of physicalsystemsanddetermineoveralltransfer function using block diagramalgebra and signal flow graphs.
						CO2	Obtain the time response of first and specifications of second order systems and determine error constants. Analyze the absolute and relative stability of LTI systems using Routh's stability criterion and root locus method.
						CO3	CO3:AnalyzethestabilityofLTIsystemsusingfrequencyresponsemethods.
						CO4	CO4: DesignLag, Lead, Lag-Lead compensators to improve system performance using Bode Diagrams.
						CO5	CO5:Applystate space analysisconceptsto represent physical systems as state models, derive transfer function and determine the response. Understand the concepts of controllability and observability
16	DR23	2	EEE	**DR23 PCL03**	**Induction and Synchronous Machines Lab**	co1	Analysethespeedcontrolmethods on3-phaseInduction Motor.
						co2	Evaluatetheperformanceof3-phaseInductionMotorbyobtainingthelocusdiagram and equivalent circuit of 3-phase Induction Motor
						co3	Adapt thepower factor improvement methodsfor singlephaseInductionMotor
						co4	Pre-determine the regulation of 3-phase alternator
						co5	Determine thesynchronousmachinereactanceof3-phasealternator

17	DR23	2	EEE	**DR23 PCL04**	**Control Systems Lab**	CO1	Analysetheperformanceof Magneticamplifier,D.CandA.C.servomotors and synchro's.
						CO2	DesignofPIDcontrollersandcompensators.
						CO3	EvaluatetemperaturecontrolofanovenusingPIDcontroller
						CO4	Determine the transfer functionofD.C Motor and examinethe truthtable oflogic gates using PLC.
						CO5	Judgethe stabilityintimeand frequencydomainandKalman'stestforcontrollability and observability.
18	DR23	2	EEE	**DR23 SEC02**	**Python Programming**	CO1	Analyzecore conceptsofconditionalcontrolstatements.
						CO2	Usageof functions,stringsandLists
						CO3	Createbuiltinfunctions,dictionariesandTupleoperations
						CO4	Accessfilesandmodulesinobjectorientedprogramming
						CO5	Createthedifferenttypesofdataformatsforstoringandtransmittinginformation
19	DR23	2	EEE	**DR23 SEC02**	**Design Thinking & Innovation**	CO1	NO CREIDTS
						CO2	
						CO3	

						CO4	
						CO5	
20	R20	2	EEE	**R2031021**	**Power Systems-II**	CO1	Calculate parameters of transmission lines for different circuit configurations.
						CO2	Determine the performance of short, medium and long transmission lines.
						CO3	Analyze the effect of traveling waves on transmission lines.
						CO4	Analyze the various voltage control methods and effect of corona.
						CO5	Calculate sag/tension of transmission lines and performance of line insulators.
21	R20	2	EEE	**R2031022**	**Power Electronics**	CO1	Illustrate the static and dynamic characteristics of SCR, Power-MOSFET and Power-IGBT.
						CO2	Analyze the operation of phase-controlled rectifiers.
						CO3	Analyze the operation of three-phase full–wave converters, AC Voltage Controllers and Cycloconverters.
						CO4	Examine the operation and design of different types of DC-DC converters.
						CO5	Analyze the operation of PWM inverters for voltage control and harmonic mitigation
22	R20	2	EEE	**R2031023**	**Control Systems**	CO1	Derive the transfer function of physical systems and determination of overall transfer function using block diagram algebra and signal flow graphs.

						CO2	Determine time response specifications of second order systems and absolute and relative stability of LTI systems using Routh's stability criterion and root locus method.
						CO3	Analyze the stability of LTI systems using frequency response methods.
						CO4	Design Lag, Lead, Lag-Lead compensators to improve system performance using Bode diagrams.
						CO5	Represent physical systems as state models and determine the response. Understand the concepts of controllability and observability
23	R20	2	EEE	**R2031 04D**	**Basics of Signals & Systems (OE- I)**	CO1	This gives the basics of signals and systems required for all electrical engineering related courses.
						CO2	To understand the behavior of signal in time and frequency domain.
						CO3	To understand the characteristics of Linear Time Invariant (LTI) systems.
						CO4	Concepts of the correlation and sampling process.
						CO5	This give concepts of signals and Systems along with its analysis using different transform techniques.
24	R20	2	EEE	**R2031 02B**	**Utilization of Electrical Energy (PE - I)**	CO1	Identify various illumination methods produced by different illuminating sources.
						CO2	Identify a suitable motor for electric drives and industrial applications
						CO3	Identify most appropriate heating and welding techniques for suitable applications.
						CO4	Distinguish various traction system and determine the tractive effort and specific energy consumption.

						CO5	Validate the necessity and usage of different energy storage schemes for different applications and comparisons.
25	R20	2	EEE	**R2031024**	**Control Systems Lab**	CO1	Design P,PI,PD and PID controllers
						CO2	Design lag, lead and lag–lead compensators
						CO3	Evaluate temperature control of an oven using PID controller
						CO4	Determine the transfer function of D.C Motor
						CO5	Analyze the performance of D.C and A.C Servo Motor.
26	R20	2	EEE	**R2031025**	**Power Electronics Lab**	CO1	Analyse characteristics of various power electronic devices and design firing circuits for SCR.
						CO2	Analyse the performance of single–phase dual, three–phase full–wave bridge converters and dual converters with both resistive and inductive loads.
						CO3	Examine the operation of Single-phase AC voltage regulator and Cycloconverter with resistive and inductive loads.
						CO4	Differentiate the working and control of Buck converter and Boost converter.
						CO5	Differentiate the working & control of Square wave inverter and PWM inverter.
27	R20	2	EEE		**Soft Skill Course:Employability Skills**	CO1	Follow strategies in minimizing time consumption in problem solving Apply shortcut methods to solve problems
						CO2	Confidently solve any mathematical problems and utilize these mathematical skills both in their professional as well as personal life.

						CO3	Analyze, summarize and present information in quantitative forms including table, graphs and formulas
						CO4	Understand the core competencies to succeed in professional and personal life
						CO5	Learn and demonstrate a set of practical skills such as time management, self-management,handling conflicts, team leadership, etc
28	R20	2	EEE	**R2032022**	**Electrical Measurements and Instrumentation**	CO1	To understand and analyze the factors that effect the various measuring units.
						CO2	To choose the appropriate meters for measuring of voltage, current, power, power factor and energy qualities & understand the concept of standardization.
						CO3	Describe the operating principle of AC & DC bridges for measurement of resistance, inductance and capacitance.
						CO4	To understand the concept of the transducer and their effectiveness in converting from one form to the other form for the ease of calculating and measuring purposes.
						CO5	To understand the operating principles of basic building blocks of digital systems, record and display units.
29	R20	2	EEE	**R2032023**	**Power System Analysis**	CO1	To develop the impedance diagram (p.u) and formation of Ybus
						CO2	To learn the different load flow methods.
						CO3	To learn the Zbus building algorithm.
						CO4	To learn short circuit calculation for symmetrical faults
						CO5	To learn the effect of unsymmetrical faults and their effects.

30	R20	2	EEE	**R203202B**	**Electric Drives (Professional Elective - II)**	CO1	To learn the fundamentals of electric drive and different electric braking methods.
						CO2	To analyze the operation of three phase converter controlled dc motors and four quadrant operation of dc motors using dual converters.
						CO3	To discuss the DC-DCconverter control of dc motors.
						CO4	To understand the concept of speed control of induction motor by using AC voltage controllers, voltage source inverters and slip power recovery scheme.
						CO5	To learn the speed control mechanism of synchronous motors
31	R20	2	EEE	**R203204H**	**Internet of Things (Open Elective – II)**	CO1	
						CO2	
						CO3	
						CO4	
						CO5	
32	R20	2	EEE	**R203202 4**	**Electrical Measurements and Instrumentation Lab**	CO1	Know about the phantom loading.
						CO2	Gain the skill knowledge of various brides and their applications.
						CO3	Learn the usage of CT's - PT's for measurement purpose.

						CO4	Know the characteristics of transducers.
						CO5	Measure the strains - frequency and phase difference.
33	R20	2	EEE	R2032026	**Power Systems and Simulation Lab**	CO1	Estimate the sequence impedances of 3-phase Transformer and Alternators
						CO2	Evaluate the performance of transmission lines
						CO3	Analyse and simulate power flow methods in power systems
						CO4	Analyse and simulate the performance of PI controller for load frequency control.
						CO5	Analyse and simulate stability studies of power systems
34	R20	2	EEE	R2032027	**Machine Learning with Python (Skill Advanced Course)**	CO1	llustrate and comprehend the basics of Machine Learning with Python
						CO2	Demonstrate the algorithms of Supervised Learning and be able to differentiate linear and logistic regressions
						CO3	Demonstrate the algorithms of Unsupervised Learning and be able to understand the clustering algorithms
						CO4	Evaluate the concepts of binning, pipeline Interfaces with examples
						CO5	Apply the sentiment analysis for various case studies
35	R20	2	EEE	R2032028	**Research Methodology**	CO1	Understand objectives and characteristics of a research problem

						CO2	Analyze research related information and to follow research ethics.
						CO3	Understand the types of intellectual property rights.
						CO4	Learn about the scope of IPR.
						CO5	Understand the new developments in IPR.
36	R20	2	EEE	**R204102C**	**Flexible Alternating Current Transmission Systems (PE – III)**	CO1	Know the concepts of facts controller and power flow control in transmission line.
						CO2	Demonstrate operation and control of voltage source converter and know the concepts of current source converter.
						CO3	Analyse compensation by using different compensators to improve stability and reduce power oscillations in the transmission lines.
						CO4	Know the concepts and methods of compensations using series compensators.
						CO5	Analyse operation of Unified Power Flow Controller (UPFC) and Interline power flow controller (IPFC)
37	R20	2	EEE	**R204102F**	**Hybrid Electric Vehicles (PE – IV)**	CO1	Know the concept of electric vehicles and hybrid electric vehicles.
						CO2	Familiar with different configurations of hybrid electric vehicles.
						CO3	Choose an effective motor for EV and HEV application
						CO4	Understand the power converters used in hybrid electric vehicles

						CO5	Know different batteries and other energy storage systems
38	R20	2	EEE	**R204102I**	**Power System Operation and Control (PE – V)**	CO1	Compute optimal load scheduling of Generators.
						CO2	Formulate hydrothermal scheduling and unit commitment problem..
						CO3	Analyse effect of Load Frequency Control for single area systems
						CO4	Analyse effect of Load Frequency Control for two area systems
						CO5	Describe the effect of reactive power control for transmission lines.
39	R20	2	EEE	**R204105N**	**AI Tools & Techniques (OE-III/JOE-III)**	CO1	
						CO2	
						CO3	
						CO4	
						CO5	
40	R20	2	EEE	**R204104M**	**Industrial Electronics (OE-IV /JOE-IV)**	CO1	To undersatnd the concept of DC Amplifiers
						CO2	To Analyze & design different voltage regulators for real time applications

						CO3	To learn the operation of three phase full–wave converters and AC/AC converters.
						CO4	To learn the operation of different types of DC-DC converters.
						CO5	To learn the operation of PWM inverters for voltage control and harmonic mitigation.
41	R20	2	EEE	**R2041011**	**Universal Human Values-2: Understanding Harmony**	CO1	Define thetermslike NaturalAcceptance, HappinessandProsperity(L1,L2)
						CO2	Identifyone'sself,and one'ssurroundings(family,societynature)(L1,L2)
						CO3	Apply what they have learnt to their own self in different day-to-day settings in real life (L3)
						CO4	Relatehumanvalueswithhumanrelationshipand humansociety.(L4)
						CO5	Justifytheneedforuniversalhumanvaluesandharmoniousexistence(L5)
42	R20	2	EEE	**R204102Q**	**Machine Learning with Python Lab (Skill Advanced Course)**	CO1	Implement procedures for the machine learning algorithms
						CO2	Design and Develop Python programs for various Learning algorithms
						CO3	Apply appropriate data sets to the Machine Learning algorithms
						CO4	Develop Machine Learning algorithms to solve real world problems
43	R20	2	EEE		**PROJECT**	CO1	

						CO2	
						CO3	
						CO4	
						CO5	

Department of electrical & Electronics engineering

S. No	Regulation	Program Code	Program Name	Course code	Course Name	CO	Course outcome: After the completion of the course student will be able to
1	DR23	42	EEE	**DR23MEET11**	**ELECTRICAL MACHINE MODELING AND ANALYSIS**	CO1	Analyze the characteristics of different types of DC motors to design suitable controllers for different applications.
						CO2	Apply the knowledge of reference frame theory for AC machines to model the induction and Synchronous machines.
						CO3	Evaluate the steady state and transient behavior of induction and synchronous machines to propose the suitability of drives for different industrial applications
						CO4	Analyze the behavior of induction machines using voltage and torque equations.

2	DR23	42	EEE	**DR23MEET12**	**ANALYSIS OF POWER ELECTRONIC CONVERTERS**	CO1	Describe and analyze the operation of AC-DC converters.
						CO2	Analyze the operation of power factor correction converters.
						CO3	Analyze the operation of three phase inverters with PWM control.
						CO4	Study the principles of operation of multi- level inverters and their applications
3	DR23	42	EEE	**DR23MEEP1B**	**POWER QUALITY AND CUSTOM POWER DEVICES**	CO1	Identify the issues related to power quality in power systems.
						CO2	Address the problems of transient and long duration voltage variations in power systems. · Analyze the effects of harmonics and study different mitigation techniques.
						CO3	Identify the importance of custom power devices and their applications.
						CO4	Acquire knowledge on different compensation techniques to minimize power quality disturbances.
4	DR23	42	EEE	**DR23MEEP2C**	**HVDC TRANSMISSION AND FLEXIBLE AC TRANSMISSION SYSTEMS**	CO1	At the end of the course, student will be able to
						CO2	Compare HVDC and EHVAC transmission systems
						CO3	Analyze converter configurations used in HVDC and evaluate the performance metrics.

						CO4	Understand controllers for controlling the power flow through a dc link and compute filter Parameters.
						CO5	Apply impedance, phase angle and voltage control for real and reactive power flow in ac transmission systems with FACTS controller.
	DR23	42	EEE	**DR23MEEL11**	**POWER ELECTRONICS SIMULATION LABORATORY**	CO1	To understand the operation of DC-DC converters, AC-DC converters, AC voltage regulators and DC-AC converters by simulation
6	DR23	42	EEE	**DR23MEEL12**	**POWER CONVERTERS LABORATORY**	CO1	Students are able to implement the converter and inverters in real time applications.
7	DR23	42	EEE	**DR23MEET21**	**SWITCHED MODE POWER CONVERSION**	CO1	Analyze operation and control of non-isolated and isolated switch mode

							converters.
						CO2	Design of non-isolated and isolated switch mode converters.
						CO3	Analyze operation and control of resonant converters.
						CO4	Feedback design of switch mode converters based on linearized models.
8	DR23	42	EEE	**DR23MEET22**	**POWER ELECTRONIC CONTROL OF ELECTRICAL DRIVES**	CO1	Understand the concepts of scalar and vector control methods for drive systems.
						CO2	Analyze and design controllers and converters for induction motor, PMSM and BLDC drives.
						CO3	Select and implement proper control techniques for induction motor and PMSM for specific applications.
						CO4	Analyze and design control techniques and converters for SRM drives.
9	DR23	42	EEE	**DR23MEEP3B**	**HYBRID ELECTRIC VEHICLES**	CO1	Know the concept of electric vehicles and hybrid electric vehicles.
						CO2	Familiar with different motors used for hybrid electric vehicles.
						CO3	Understand the power converters used in hybrid electric vehicles
						CO4	Know different batteries and other energy storage systems.

10	DR23	42	EEE	**DR23MEEP4B**	**APPLICATIONS OF POWER CONVERTERS**	CO1	Analyze power electronic application requirements.
						CO2	Identify suitable power converter from the available configurations.
						CO3	Develop improved power converters for any stringent application requirements. · Improvise the existing control techniques to suit the application.
						CO4	Design of Bi-directional converters for charge/discharge applications
11	DR23	42	EEE	**DR23MEEL21**	**ELECTRIC DRIVES SIMULATION LABORATORY**	CO1	At the end of the course, student will be able to analyze the performance of different electrical machines and drives
12	DR23	42	EEE	**DR23EEL22**	**ELECTRIC DRIVES LABORATORY**	CO1	The student should understand the performance of DC & AC drives.

13	DR23	42	EEE	**DR23MEEP5B**	**SMART GRID TECHNOLOGIES**	CO1	Understand smart grids and analyze the smart grid policies and developments in smart grids.
						CO2	Develop concepts of smart grid technologies in hybrid electrical vehicles etc.
						CO3	Understand smart substations, feeder automation, GIS etc.
						CO4	Analyze micro grids and distributed generation systems.
						CO5	Analyze the effect of power quality in smart grid and to understand latest developments in ICT for smart grid.
14	DR23	42	EEE	**DR23MEEO1A**	**INDUSTRIAL SAFETY**	CO1	Understand the general industrial requirements like lighting, cleanliness prevention from hazards and accidents.
						CO2	Analyze maintenance requirements of the industry and cost associated.
						CO3	Analyze wear and corrosion aspects of the industry and their prevention.
						CO4	Identify the faults prone areas and their repair and periodic maintenance.

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Dadi Institute of
Engineering & Technology
Autonomous
Anakapalle - 531 002.