

DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCE

## INSTITUTE VISION

"To be the center of excellence in technical education and research".

## INSTITUTE MISSION

"To address the emerging needs through quality technical education and advanced research".

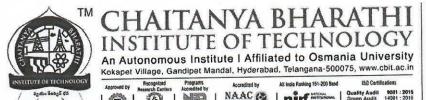
## DEPARTMENT VISION

"To be a globally recognized center of excellence in the field of Artificial Intelligence and Data Science that produces innovative pioneers and research experts capable of addressing complex real-world challenges and contributing to the socio-economic development of the nation."

# DEPARTMENT MISSION

- 1. To provide cutting-edge education in the field of Artificial Intelligence and Data Science that is rooted in ethical and moral values.
- 2. To establish strong partnerships with industries and research organizations in the field of Artificial Intelligence and Data Science, and to excel in the emerging areas of research by creating innovative solutions.
- 3. To cultivate a strong sense of social responsibility among students, fostering their inclination to utilize their knowledge and skills for the betterment of society.
- 4. To motivate and mentor students to become trailblazers in Artificial Intelligence and Data Science, and develop an entrepreneurial mindset that nurtures innovation and creativity.





### DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCE

#### PROGRAM EDUCATIONAL OBJECTIVES (PEOS):

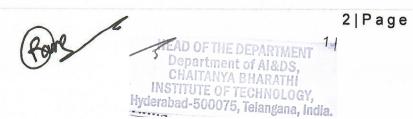
#### Graduates of AI & DS will be able to:

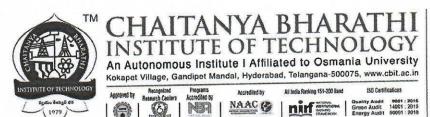
- Adapt emerging technologies of Artificial Intelligence & Data Science and develop state of the art solutions in the fields of Manufacturing, Agriculture, Health-care, Education, and Cyber Security.
- 2. Exhibit professional leadership qualities to excel in interdisciplinary domains.
- 3. Possess human values, professional ethics, application-oriented skills, and engage in lifelong learning.
- 4. Contribute to the research community to meet the needs of public and private sectors.

#### PROGRAM SPECIFIC OUTCOMES (PSOs):

#### After successful completion of the program, students will be able to:

- 1. Exhibit proficiency of Artificial Intelligence and Data Science in providing sustainable solutions by adapting to societal, environmental and ethical concerns to real world problems.
- 2. Develop professional skills in the thrust areas like ANN and Deep learning, Robotics, Internet of Things and Big Data Analytics.
- 3. Pursue higher studies in Artificial Intelligence and Data Science in reputed Universities and to work in research establishments.

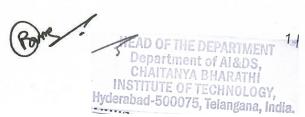




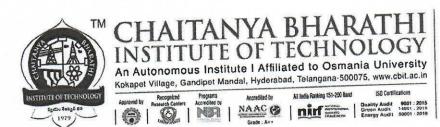
## DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCE

#### **Programme Outcomes**

- Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems
- Problem analysis: Identify, formulate, review, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling to complex engineering activities with an understanding of the limitations.
- 6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.



- 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



# DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCE Course Outcomes Academic Year 2023-2024

S. No.	Year/ Sem	Name of the C	Course	
1	I/I	22MTC01 : LINEAR ALGEBRA & CALCULUS		
		22MTC01.1	Determine the extreme values of functions of two variables.	
		22MTC01.2	Apply the vector differential operator to scalar and vector functions	
		22MTC01.3	Solve line, surface & volume integrals by Greens, Gauss and Stoke's theorems.	
		22MTC01.4	Determine the basis and dimension of a vector space, compute linear transformation.	
		22MTC01.5	Apply the Matrix Methods to solve the system of linear equations	
2	I/I	22PYC01: OPTICS AND SEMICONDUCTOR PHYSICS		
		22PYC01.1	Demonstrate the physical properties of light.	
		22PYC01.2	Explain characteristic properties of lasers and fiber optics	
		22PYC01.3	Find the applications of quantum mechanics	
		22PYC01.4	Classify the solids depending upon electrical conductivity	
		22PYC01.5	Identify different types of semiconductors	
3	1/1	22CSC01: PROBLEM SOLVING AND PROGRAMMING		
		22CSC01.1	Understand real world problems and develop computer solutions for those problems. 6. Handle data using files.	
		22CSC01.2	Understand the basics of Python.	
		22CSC01.3	Apply Python for solving basic programming solutions.	
		22CSC01.4	Create algorithms/flowcharts for solving real-time problems.	



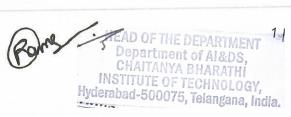
		22CSC01.5	Build and manage dictionaries to manage data.
		22CSC01.6	Handle data using files.
4	I/I	22EGC01: ENC	ELISH
4		22EGC01.1	Illustrate the nature, process and types of communication and communicate effectively without barriers.
		22EGC01.2	Construct and compose coherent paragraphs, emails and adhering to appropriate mobile etiquette.
		22EGC01.3	Apply techniques of precision to write a précis and formal letters by using acceptable grammar and appropriate vocabulary.
		22EGC01.4	Distinguish formal from informal reports and demonstrate advanced writing skills by drafting formal reports.
		22EGC01.5	Critique passages by applying effective reading techniques.
5	I/I	22PYC03 : OI	PTICS AND SEMICONDUCTOR PHYSICS LAB
		22PYC03.1	Interpret the errors in the results of an experiment.
		22PYC03.2	Demonstrate physical properties of light experimentally
		22PYC03.3	Make use of lasers and optical fibers for engineering applications
		22PYC03.4	Explain the V-I characteristics of some optoelectronic and semiconductor devices
		22PYC03.5	Find the applications of thermistor
6	1/1	22EGC02 : E	ENGLISH LAB
		22EGC02.1	Define the speech sounds in English and understand the nuances of pronunciation in English
		22EGC02.2	Apply stress correctly and speak with the proper tone intonation and rhythm.
		22EGC02.3	Analyze listening comprehension texts to enhance the listening skills.
		22EGC02.4	Determine the context and speak appropriately in various situations.
		22EGC02.5	Design and present effective posters while working in team and discuss and participate in Group discussions.
7	I/I	2205002 • 1	PROBLEM SOLVING AND PROGRAMMING LAB



		22CSC02.1	Understand various Python program development Environments.
		22CSC02.2	Demonstrate the concepts of Python.
		22CSC02.3	Implement algorithms/flowcharts using Python to solve realworld problems.
		22CSC02.A	Build and manage dictionaries to manage data.
		22CSC02.5	Write Python functions to facilitate code reuse. 6. Use Python to handle files and memory.
		22CSC02.6	Use Python to handle files and memory.
8	I/I	22MEC01 : CA	AD AND DRAFTING
3	-/-	22MEC01.1	Become conversant with appropriate use of CAD software for drafting.
		22MEC01.2	Recognize BIS, ISO Standards and conventions in Engineering Drafting.
		22MEC01.3	Construct the projections of points, lines, planes, solids
		22MEC01.4	Analyse the internal details of solids through sectional views
		22MEC01.5	Create an isometric projections and views
9	I/I	22MEC38 : D	IGITAL FABRICATION LAB
		22MEC38.1	Understand safety measures to be followed in workshop to avoid accidents.
		22MEC38.2	Identify various tools used in carpentry, house wiring and plumbing.
		22MEC38.3	Make a given model by using workshop trades like carpentry, plumbing, House wiring and 3d modeling using solid works software for Additive Manufacturing.
		22MEC38.4	Perform pre-processing operations on STL files for 3D printing, also understand reverse engineering process.
		22MEC38.5	Conceptualize and produce simple device/mechanism of their choice.
10	1/11	22MTC04 : I	Differential Equations & Numerical Methods
		22MTC04.1	Calculate the solutions of first order linear differential equations.
		22MTC04.2	Calculate the solutions of higher order linear differential equations.
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		22MTC04.3	Solve the algebraic, transcendental and system of equations.
		22MTC04.4	Apply interpolation and numerical differentiation techniques for given data.
		22MTC04.5	Test the convergence and divergence of Infinite series.
	I/II	22CYC01 : CH	IEMISTRY
11	1/11	22CYC01.1	Identify the microscopic chemistry in terms of molecular orbitals, intermolecular forces and rate of chemical reactions.
		22CYC01.2	Discuss the properties and processes using thermodynamic functions, electrochemical cells and their role in batteries and fuel cells.
		22CYC01.3	Illustrate the major chemical reactions that are used in the synthesis of organic molecules.
		22CYC01.4	Classify the various methods used in treatment of water for domestic and industrial use.
		22CYC01.5	Outline the synthesis of various Engineering materials & Drugs.
12	I/II	22EEC01 : B	BASIC ELECTRICAL ENGINEERING
		22EEC01.1	Understand the concepts of Kirchhoff's laws and their application various theorems to get solution of simple docircuits.
		22EEC01.2	Predict the steady state response of RLC circuits with AC single phase/three phase supply.
		22EEC01.3	Infer the basics of single phase transformer
		22EEC01.4	Describe the construction, working principle of DC machine and 3-phase Induction motor.
		22EEC01.5	Acquire the knowledge of electrical wires, cables, earthing Electrical safety precautions to be followed in electrical installations and electric shock and its safety and energy calculations.
13	I/II	22CSC03:	OBJECT ORIENTED PROGRAMMING
		22CSC03.1	Understand the concepts of Object-Oriented features.
		22CSC03.2	and different libraries to solv
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		22CSC03.4	Develop programs to access databases and web data.
			8 Page

		22CSC03.5	Understand APIs and third-party libraries to be used with Python.
14	I/II	22CYC02 : CH	
••		22CYC02.1	Identify the basic chemical methods to analyse the substances quantitatively & qualitatively.
		22CYC02.2	Estimate the amount of chemical substances by volumetric analysis.
		22CYC02.3	Determine the rate constants of reactions from concentration of reactants/ products as a function of time.
		22CYC02.4	Calculate the concentration and amount of various substances using instrumental techniques.
		22CYC02.5	Develop the basic drug molecules and polymeric compounds.
15	I/II	22MBC02 : C0	OMMUNITY ENGAGEMENT
		22MBC02.1	Gain an understanding of Rural life, Culture and Social realities.
		22MBC02.2	Develop a sense of empathy and bonds of mutuality with Local Communities.
		22MBC02.3	Appreciate significant contributions of Local communities to Indian Society and Economy.
7 =		22MBC02.4	Exhibit the knowledge of Rural Institutions and contributing to Community's Socio-Economic improvements.
		22MBC02.5	Utilise the opportunities provided by Rural Development Programmes.
16	I/II	22MEC37 : R	OBOTICS AND DRONES LAB
		22MEC37.1	Demonstrate knowledge of the relationship between mechanical structures of robotics and their operational workspace characteristics
		22MEC37.2	Understand mechanical components, motors, sensors and electronic circuits of robots and build robots.
		22MEC37.3	Demonstrate knowledge of robot controllers.
		22MEC37.4	Use Linux environment for robotic programming.
		22MEC37.5	Write Python scripts to control robots using Python and Ope CV.
17	I/II	22EEC02 : B	ASIC ELECTRICAL ENGINEERING LAB
		22EEC02.1	Comprehend the circuit analysis techniques using variou circuital laws and theorems.



		22EEC02.2	Analyse the parameters of the given coil and measurement of power and energy in AC circuits
		22EEC02.3	Determine the turns ration/performance parameters of single-phase transformer
		22EEC02.4	Infer the characteristics of DC shunt motor different tests.
		22EEC02.5	Illustrate different parts and their function of electrical components, equipment and machines.
18	1/11	22MTC07 : Ma	athematical and Statistical Foundations
10	1,11	22MTC07.1	Apply the statistical averages for identifying behaviour of the data.
		22MTC07.2	Analyse the data using probabilistic models.
		22MTC07.3	Apply the probability function to characterise the random phenomenon.
		22MTC07.4	Analyse data using different methods of hypothesis testing.
		22MTC07.5	Apply the number theory concept to cryptography domain.
19	11/1	22CSC15 : O	PERATING SYSTEMS
		22CSC15.1	Understand the basics of Operating systems and its major components.
		22CSC15.2	Illustrate the concepts related to process management. Operating system.
		22CSC15.3	Distinguish various memory management techniques.
		22CSC15.4	Apply concepts of process synchronization and deadlocks to a given situation.
		22CSC15.5	Evaluate various file allocation methods and Apply security as well as recovery features in the design
20	II/I	22CSC11 : I	DATA BASE MANAGEMENT SYSTEMS
		22CSC11.1	Design database schema for an application using RDBMS concepts.
		22CSC11.2	Write SQL queries for tasks of various complexities.
		22CSC11.3	Build applications using database system as backend.
		22CSC11.4	Understand internal working of a DBMS including dat storage, indexing, query processing, transaction processing concurrency control and recovery mechanisms.



			Analyze non-relational and parallel/distributed data
		22CSC11.5	management systems with a focus on scalability.
1	II/I	22ITC01 : DIG	ITAL LOGIC AND COMPUTER ARCHITECTURE
-		22ITC01.1	Apply Boolean algebra for simplification and learn representation of data using numbers.
		22ITC01.2	Understand fundamentals of combinational & sequential logic gates, registers and counters.
		22ITC01.3	Infer the architecture and functionality of the central processing unit.
		22ITC01.4	Explore the techniques that computers use to communicate with I/O devices for data transfer.
		22ITC01.5	Comprehend memory hierarchy, cache memory and virtual memory.
22	II/I	22ITC02 : JA	VA PROGRAMMING
		22ITC02.1	Apply the concept of OOP to design, implement and execute programs.
		22ITC02.2	Use the strings, interfaces, packages and inner classes for application development.
		22ITC02.3	Apply the exception handling mechanisms and multithreading for the development.
		22ITC02.4	Develop applications using collection framework.
		22ITC02.5	Develop database applications using SQL package.
23	II/I	22CSC05 : D.	ATA STRUCTURES
		22CSC05.1	Understand the basic concepts and types of data structures
		22CSC05.2	Analyze various linear and nonlinear data structures.
		22CSC05.3	Identify the applications of linear and nonlinear data structures and significance of balanced search trees hashing.
		22CSC05.4	Evaluate various searching and sorting techniques.
		22CSC05.5	Use appropriate data structures to design efficient algorithms.
24	II/I	22EGM01 : I	INDIAN CONSTITUTION AND FUNDAMENTAL PRINCIPLES
		22EGM01.1	Understand the history of framing of the Indian Constitution and its features.

		22EGM01.2	Assess the realization of Fundamental Rights and Directive Principles of State Policy.
		22EGM01.3	Analyze the challenges to federal system and position of the President and the Prime Minister in the Union Government.
		22EGM01.4	Underline the role of the Legislature and the Judiciary in Union Government and their mutual relations.
		22EGM01.5	Evolve the development of the local governments in India and assess the role of Collector in district administration.
25	II/I	22CSC33 : DA	TA BASE MANAGEMENT SYSTEMS LAB
<b>2</b> 5		22CSC33.1	Outline the built-in functions of SQL and apply these functions to write simple and complex queries using SQL operators.
		22CSC33.2	Demonstrate Queries to Retrieve and Change Data using Select, Insert, Delete and Update. ConstructQueries using Group By, Order By and Having Clauses.
		22CSC33.3	Demonstrate Commit, Rollback, Save point commands, SQL Plus Reports and formulate the Queries forCreating, Dropping and Altering Tables, Views, constraints.
		22CSC33.4	Develop queries using Joins, Sub-Queries and Working with Index, Sequence, Synonym, ControllingAccess and Locking Rows for Update, Creating Password and Security features.
		22CSC33.5	Develop PL/SQL code using Cursors, Exception, Composite Data Types and Procedures, Functions and Packages.
26	II/I	22ITC03 : JA	AVA PROGRAMMING LAB
		22ITC03.1	Practice the basics of OOPs to develop java applications.
		22ITC03.2	Use the inheritance and interfaces for application development.
		22ITC03.3	Apply the exception handling and multithreading to handle multiple flows of execution.
		22ITC03.4	Develop applications using collection framework.
		22ITC03.5	Apply the SQL concepts for application development.
27	II/I	22CSC31:	DATA STRUCTURES LAB
		22CSC31.1	Implement the abstract data type.
		22CSC31.2	Implement linear and non-linear data structures.
		22CSC31.3	Evaluate various sorting techniques.

		22CSC31.4	Analyze various algorithms of linear and nonlinear data structures.
		22CSC31.5	Choose or create appropriate data structures to solve real world problems.
	II/I	22ADI01 : MO	OCS / TRAINING / INTERNSHIP
28	11/1	22ADI01.1	Learn new technologies and solve real time projects.
		22ADI01.2	Expose to the industrial environment problems and technologies
		22ADI01.3	Gain knowledge on contemporary technologies industrial requirements.
		22ADI01.4	Identify, Design and Develop solutions for real world problems
		22ADI01.5	Communicate their ideas and learning experiences through reports and presentation.
	II/II	22MTC16 : S	tochastic Process and Queueing Theory
29	11/11	22MTC16.1	Estimate the marginal probabilities of statistical averages.
		22MTC16.2	Distinguish the random process of auto correlation and cross correlation.
		22MTC16.3	Characterize the random process of ensemble averages.
		22MTC16.4	Analyze the effect the thermal noise in the system.
		22MTC16.5	Analyze the queuing behavior of different queuing models.
	77 /77	Company of the second s	SYSTEMS AND SIGNAL PROCESSING
30	11/11	22ECC39.1	Classify signals, analyse the signals using Transform techniques.
		22ECC39.2	Evaluate signal characteristics in frequency domain.
		22ECC39.3	Assess the system stability and causality using ROC an Pole-Zero Plot.
		22ECC39.4	techniques
		22ECC39.5	Describe and analyse the DT Signal/systems using DF DCT, DWT, FFT and Z-Transform
31	II/II	22CSC14:	DESIGN AND ANALYSIS OF ALGORITHMS
	,	22CSC14.1	of algorithms using asymptot

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		22CSC14.2	Demonstrate familiarity with major algorithms and importance of algorithm design techniques.
		22CSC14.3	Apply algorithm design techniques on different problems.
		22CSC14.4	Analyze the efficiency of the algorithms.
		22CSC14.5	Understanding limits of efficient computation with the help of complexity classes.
32	II/II	22ADC01 : FU	INDAMENTALS OF MACHINE LEARNING
		22ADC01.1	Explain the types of machine learning and handle the challenges of machine learning.
		22ADC01.2	Construct Decision Trees, Measure performance of classifiers.
		22ADC01.3	Apply Regression, Logistic Regression and gradient descent to solve problems.
		22ADC01.4	Design solutions using Bayesian classifier, SVMs and Ensemble methods.
		22ADC01.5	Perform Dimensionality reduction and clustering of data
33	II/II	22MBC01: ENGINEERING ECONOMICS AND ACCOUNTANCY	
		22MBC01.1	Apply fundamental knowledge of Managerial Economics concepts and tools.
		22MBC01.2	Analyze various aspects of Demand Analysis, Supply and Demand Forecasting.
		22MBC01.3	Understand Production and Cost relationships to make best use of resources available.
		22MBC01.4	Apply Accountancy Concepts and Conventions and preparation of Final Accounts.
		22MBC01.5	Evaluate Capital and Capital Budgeting decision based or any technique.
34	II/II	22CEM01 : E	ENVIRONMENTAL SCIENCE (MANDATORY COURSE)
		22CEM01.1	Identify the natural resources and realise the importance of water, food, forest, mineral, energy, land resources and effects of over utilisation.
		22CEM01.2	Understand the concept of ecosystems and realise th importance of interlinking of food chains.
		22CEM01.3	Contribute for the conservation of bio-diversity.
		22CEM01.4	Suggest suitable remedial measure for the problems of environmental pollution and contribute for the framing of legislation for protection of environment.

		22CEM01.5	Follow the environmental ethics and contribute to the mitigation and management of environmental disasters.
5	II/II	22ITE02 : DIGI	TAL IMAGE PROCESSING
5	11, 11	22ITE02.1	Illuminate the fundamental concepts and applications of digital image processing techniques.
		22ITE02.2	Demonstrate intensity transformations, spatial filtering, smoothing and sharpening in both spatial and frequency domains, image restoration concepts.
		22ITE02.3	Demonstrate image restoration and morphological image processing methods.
		22ITE02.4	Apply object recognition techniques by using image segmentation and image representation & description methods.
		22ITE02.5	Illustrate the various colour models and Application of image compression methods.
36	II/II	22ITE04 : MO	BILE APPLICATION DEVELOPMENT
	-	22ITE04.1	Understand the benefits of using Kotlin for Mobile application development.
		22ITE04.2	Design user interface for mobile applications.
		22ITE04.3	Use Intent, Broadcast receivers and Internet services in Android App.
#62.56.FTC	40 AUST A. 187	22ITE04.4	Use multimedia, camera and Location based services in Android Apparate Communication based services in
		22ITE04.5	Apply best practices to implement databases and publish apps on Playstore.
37	II/II	22ITC17 : W	EB TECHNOLOGIES
		22ITC17.1	Create web pages with good aesthetic sense of design using HTML CSS3, Bootstrap and popular themes.
		22ITC17.2	Use JS in Validations and DOM manipulation.
		22ITC17.3	Design Schema and perform CRUD operations from U components.
		22ITC17.4	Become an agile practitioner with the ability to quickle complete projects using ReactJS.
		22ITC17.5	Build an end-to-end application from scratch using React JS NODE JS, Express JS and Mongo DB.
38	II/II	22ADE01:	DATA ANALYSIS AND VISUALIZATION

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42	11/11	22ADC02:	MACHINE LEARNING LAB  16   Page
		22CSC34.5	acquired knowledge.
		22CSC34.4	
		22CSC34.3	Analyze the performance of various algorithms.
		22CSC34.2	Demonstrate various algorithmic design techniques.
71	**/**	22CSC34.1	Implement greedy, dynamic programming, backtracking an branch and bound techniques.
41	II/II	22CSC34 :	DESIGN AND ANALYSIS OF ALGORITHMS LAB
		22MTC17.5	Analyze the queuing behavior of different queuing models.
		22MTC17.4	Analyze the probabilities using probability functions.
		22MTC17.3	Characterize the bivariate probability distribution of averages
		22MTC17.2	Compute the measures of variation for stochastic data
40	II/II	22MTC17.1	Interpret the plots of statistical averages
	¥4 / 77	22MTC17 : S	TOCHASTIC PROCESS AND QUEUEING THEORY LAB
		22ADE02.5	Understand outlier detection and real time applications of data mining.
		22ADE02.4	Analyze advanced classification methods and clustering techniques.
		22ADE02.3	Evaluate various models for classification and prediction.
		22ADE02.2	Build multidimensional data model and perform OLAP operations, generate association rules.
		22ADE02.1	Understand the concepts and issues of data mining, apply preprocessing techniques.
39	II/II	22ADE02 : DA	TA WAREHOUSING AND DATA MINING
		22ADE01.5	Apply 2-D and 3-D plotting techniques on datasets using matplotlib and seaborn
		22ADE01.4	Analyze the given dataset and derive conclusions using inferential statistics.
		22ADE01.3	Perform various preprocessing operations on datasets using Pandas Series and DataFrame objects.
		22ADE01.2	Apply pandas library functions for handling data frames.
	100	22ADE01.1	Use Numpy library utilities for various numerical operations.

46	III/I	20ITC19 : C	PERATING SYSTEMS
		20ITC24.5	Implement standard IoT to build large systems for industries.
		20ITC24.4	Design and Develop IoT computing and its applications.
		20ITC24.3	Learn the methodology for IoT system design and interface with Raspberry Pi.
		20ITC24.2	Describe the role of things and Internet in IoT and determine the IoT levels designing an IoT Systems.
		20ITC24.1	Develop and design for Embedded computing using 8051 Microcontroller.
45	III/I	20ITC24 : EI	MBEDDED SYSTEMS AND IOT
		20ADC06.5	Apply AI concepts to solve the real-world problems.
		20ADC06.4	Design applications using Reinforcement Learning.
		20ADC06.3	Understand probabilistic reasoning and Markov decision process to solve real world problems.
		20ADC06.2	Identify and formulate search strategies to solve problems by applying suitable search strategy.
		20ADC06.1	Define the role of agents and interaction with the environment to establish goals.
44	III/I	20ADC06 : A	RTIFICIAL INTELLIGENCE
		22ADC04.5	Creating a table and drawing a figure in LateX
		22ADC04.4	Display of equations in LaTeX.
		22ADC04.3	Typing of text including roman letters, alphabets, special symbols and mathematical symbols in LaTeX.
		22ADC04.2	Understand the shell programming on UNIX OS
		22ADC04.1	Run various UNIX commands on a standard UNIX/LINUX Operating system
43	II/II	22ADC04 : LI	NUX AND LATEX LAB
		22ADC02.5	Use principle Component Analysis for feature Extraction.
		22ADC02.4	Perform clustering of data.
		22ADC02.3	Design solutions using SVM, KNN, Regression algorithms.
		22ADC02.2	Build decision trees for classification.
		22ADC02.1	Perform dimensionality reduction of a dataset.

		20ITC19.1	Demonstrate operating system services, inter process communication and multithreaded Programming.	
		20ITC19.2	Apply suitable process scheduling, deadlocks handling algorithms and solve process-synchronization.	
		20ITC19.3	Make use of advanced techniques such as paging, segmentation and virtual memory for memory management.	
		20ITC19.4	Illustrate file system interfaces and its implementation.	
		20ITC19.5	Identify the Operating System Security problems and Threats.	
47	III/I	20ADC07 : FU	LL STACK DEVELOPMENT	
		20ADC07.1	Create web pages with good aesthetic sense of design using HTML and CSS	
		20ADC07.2	Create real-world React web applications and related tools.	
		20ADC07.3	Become an agile practitioner with the ability to quickly complete projects	
		20ADC07.4	Build an end-to-end application from scratch using NODE JS	
		20ADC07.5	Understand and build logical relationships between documents using MongoDB	
48	III/I	20ITC20 : COMPUTER NETWORKS		
		20ITC20.1	Summarize functions of each layer in the OSI and TCP/IF reference models and demonstrate the systematic understanding of data communication Techniques.	
		20ITC20.2	Solve problems related to Addressing, Routing Interoperability among heterogeneous networks.	
		20ITC20.3	Identify issues in Internetwork Routing issues and Congestion in computer networks.	
		20ITC20.4	Appraise the functions and performance of Internet Transpor Protocols TCP and UDP.	
		20ITC20.5	Analyze the operating principles of Domain Name System and Electronic Mail, WWW.	
48	III/I	20ADE03 : N	ATURAL LANGUAGE PROCESSING	
		20ADE03.1	Justify the various steps necessary for processing natural language	
		20ADE03.2	Suggest appropriate semantic modeling and sequence labeling techniques for a particular application.	
		20ADE03.3	Apply appropriate neural network-based models for contextual application	
			18   Page	



		20ADE03.4	Analyze existing encoder-decoder models and information extraction techniques.
		20ADE03.5	Identify the significance of word net and analyze the applications of Natural Language Processing such as Question Answering and chatbots.
	III/I	20ADE04 : NO	SQL DATABASES
9	111/1	20ADE04.1	Define, compare and use the four types of NoSQL Datasassas
		20ADE04.2	Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Key-Value Pair NoSQL databases.
		20ADE04.3	Explain the detailed architecture, define objects, load data, query data and performance tune Document oriented NoSQL databases.
		20ADE04.4	Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases.
		20ADE04.5	Explain the detailed architecture, define objects, load data, query data and performance tune Graph NoSQL databases.
50	III/I	20ITE13 : CC	MPUTER VISION
50	111/1	20ITE13.1	Summarize the fundamentals of Image formation and describe the Geometric primitives and Transformations.
		20ITE13.2	Describe different approaches to recognition of objects.
		201723.3	Inspect algorithms for feature detection and feature alignment.
		20ITE13.4	Analyze images and videos for problems such as tracking and structure from motion.
		20ITE13.5	Design recovered 3D structure for ill-posed scenes.
	III/I		YBER SECURITY
51	111/1	20ITE08.1	Describe legal frameworks to handle cybercrimes.
		20ITE08.2	Identify the functioning of different kinds of malware used in cybercrimes.
		20ITE08.3	Examine the legal perspectives of cybercrimes in Indian an international context.
		20ITE08.4	Describe the need of Digital Forensics and the importance digital evidence in prosecution
		20ITE08.5	and a serial activities in the event of significan



2	III/I	20ADE05 : COM	MPILER DESIGN (Professional Elective #2)
		20ADE05	Identify the concepts related to translator, tokens, bootstrapping, porting and phases of the compiler and develop Lexical-Analyzer for Source Language.
		20ADE05	Construct Top-down parsers and Bottom-up parsers.
		20ADE05	Develop Syntax Directed Translation scheme and Generate Intermediate code for a language.
		20ADE05	Translate Intermediate code into Target code.
F2		20ADE05	Understand Data flow Analysis and apply the optimization techniques.
	III/I	20ITE07 : AUG	GMENTED AND VIRTUAL REALITY (Professional Elective #2)
53	111/1	20ITE07.1	Describe the basic concepts of Virtual Reality and 3D Computer Graphics.
		20ITE07.2	Apply 3D manipulation techniques in Virtual Reality.
		20ITE07.3	Analyze Development Tools and Frameworks in Virtual Reality.
		20ITE07.4	Develop a Virtual Reality application.
		20ITE07.5	Evaluate Augmented Reality Systems
54	III/I	20ADC08 : A	RTIFICIAL INTELLIGENCE LAB
		20ADC08.1	Understand the types of informed and uninformed problems and apply search strategies to solve them.
		20ADC08.2	Demonstrate Basic Prolog programming
		20ADC08.3	Solve real-life problems using AI techniques like game search
		20ADC08.4	Apply probabilistic reasoning on data.
		20ADC08.5	Analyze the Q-learning Algorithm.
55	111/1	20ITC26 : E	MBEDDED SYSTEMS AND IOT LAB
		20ITC26.1	Program using Raspberry Pi.
		20ITC26.2	Develop python programs that run on Raspberry Pi/Arduin
		20ITC26.3	Write basic IoT Programs using Raspberry Pi/Arduino.
		20ITC26.4	Implement Applications using Raspberry Pi / Arduino.
		20ITC26.5	Develop simple IoT systems of different Case studies.

6	III/I	20ADC09: MIN	OR PROJECT-I (Full Stack Development)
		20ADC09.1	Interpret Literature with the purpose of formulating a project proposal.
		20ADC09.2	Plan, analyze, Design and implement a project.
		20ADC09.3	Find the solution of identified problem with the help of modern Technology and give priority to real time scenarios.
		20ADC09.4	Plan to work as a team and to focus on getting a working project done and submit a report within a stipulated period of time.
		20ADC09.5	Prepare and submit the Report and deliver a presentation before the departmental Committee.
57	III/II	20ITC13 : SOI	TWARE ENGINEERING
57	111,11	20ITC13.1	Identify the minimum requirements for the development of application.
		20ITC13.2	Build a system, component, or process to meet desired needs of a customer.
		20ITC13.3	Involve in analysis and design of UML models for various case studies.
		20ITC13.4	Acquire thorough knowledge of standard UML notations.
		20ITC13.5	Know the risks, formulate and implement software projects.
58	III/II	20ADC10: DE	CEP LEARNING
38	,	20ADC10.1	Explain the basic principles of neural networks and deep learning.
		20ADC10.2	Implement simple neural network algorithms.
-		20ADC10.3	Compare modeling aspects of various neural network architectures.
		20ADC10.4	Evaluate Convolutional Neural Network models on real data sets.
		20ADC10.5	Analyze and optimize Recurrent Neural Network models for various application
59	III/II	20ADC11: D	ATA SCIENCE WITH 'R'
		20ADC11.1	Explore data operations on files and databases using programming.
		20ADC11.2	Understand deployment of models on different datasets.
		20ADC11.3	Apply supervised, unsupervised, ensembling and NLP mode



			on different datasets.		
		20ADC11.4	Perform Sentiment analysis.		
		20ADC11.5	Build and evaluate the models.		
60	III/II	20ITC25 : CLC	OUD COMPUTING		
		20ITC25.1	Understand the basic ideas of Cloud Computing and its services.		
		20ITC25.2	Analyze the architecture, deployment models, and infrastructure models of Cloud Computing.		
		20ITC25.3	Realize distributed storage and performance for implementing virtualization.		
		20ITC25.4	Analyze cloud computing security, federation, presence, identity, and privacy.		
		20ITC25.5	Use IaaS / PaaS service offered by cloud service providers		
61	III/II	20ADE06: MICROSERVICES WITH SPRING BOOT			
		20ADE06.1	Gain the basic concepts of the Spring Framework		
		20ADE06.2	Interact with databases using Spring's support for JDBC and JPA.		
		20ADE06.3	Build spring boot applications using Dependency Injection concept		
Minus Books	war water of the	20ADE06.4	Apply Transaction Management concepts of spring in Enterprise Application Development and develop the Spring-MVC based Applications to solve the real-world problems.		
		20ADE06.5	Use Spring Unit testing framework and configure security on Spring MVC Applications		
62	III/II	20ADE07 : E	XPLAINABLE ARTIFICIAL INTELLIGENCE		
		20ADE07.1	Describe the context of the machine learning application and why explainability would help, but also scrutinize which kind of explainability technique is necessary.		
		20ADE07.2	Understand the concepts that are important in model validation, evaluation, and performance visualization for both supervised and unsupervised learning.		
		20ADE07.3	Install and set up one or more post hoc explain ability techniques through a self-chosen set of programming platforms.		
		20ADE07.4	Critically reflect on the results from Explainable deep learning techniques and suggest how it helps the problem context.		



		20ADE07.5	Demonstrate comprehension of challenges and future related to Explainable AI
3	III/II	20ITE14: APPLIED PREDICTIVE ANALYTICS	
•	122, 22	20ITE14.1	Comprehend predictive modeling and assess the performance
		20ITE14.2	Apply regression techniques and analyze the performance
		20ITE14.3	Demonstrate Support Vector Machines and build an efficient networking model
		20ITE14.4	Analyze ensemble methods by choosing Tree based classifiers
		20ITE14.5	Select appropriate probabilistic Graphical models and identify topics through topic modeling
64	III/II	20ITE16 : FUI	NDAMENTALS OF BLOCK CHAIN TECH
04	111,12	20ITE16.1	Describe the concepts of distributed systems and blockchain properties.
		20ITE16.2	Identify the significance of the bitcoin ecosystem.
		20ITE16.3	Examine the consensus mechanisms and technologies that support ethereum.
		20ITE16.4	Inspect Hyperledger Fabric and its architecture.
		20ITE16.5	Analyze blockchain use cases in various domains.
65	III/II	20ADE08 : A	GILE PROJECT MANAGEMENT
00		20ADE08.1	Describe the Agile Life cycle models.
		20ADE08.2	Identify the scope and requirements for Agile project development
		20ADE08.3	Appraise the Agile Planning and scheduling mechanisms for an enterprise Agile project.
		20ADE08.4	Describe the Quality Principles in the Agile space.
	-11	20ADE08.5	Analyze Matrix Management in the Agile Space
66	111/11	20ADE09 : S	SOCIAL NETWORK ANALYSIS
		20ADE09.1	Understand the basics of social network analysis.
		20ADE09.2	Analyze Ontology representation of social network data.
		20ADE09.3	Apply supervised and unsupervised algorithms on social networks.
		20ADE09.4	Interpret the semantic content of social media data.

		20ADE09.5	Build social network model for real time applications.
	1		TWARE ENGINEERING LAB
The Control of the Co	/ 77	20ITC16.1	Interpret user requirements using the UML notation.
67	III/II	20ITC16.2	Illustrate Dynamic models of a software system.
		20ITC16.3	Analyze and develop class diagrams that model a software system.
		20ITC16.4	Develop Activity and swimlane models.
		20ITC16.5	Outline analysis and design models.
	III/II	NO ACCUMUNATION OF THE PERSON	CP LEARNING LAB
58	111/11	20ADC12.1	Preprocess the data to train on Neural Networks
		20ADC12.2	Design and Implement Multilayer Perceptron Networks.
		20ADC12.3	Identify suitable Neural Network topology to solve a problem.
		20ADC12.4	Evaluate and Tune the Convolutional Neural Network models on real dataset(s)
		20ADC12.5	Analyze and Tune the Recurrent Neural Network models on real dataset(s)
60	III/II	20ADC13 : M	INOR PROJECT-II (Data Science)
69		20ADC13.1	Interpret Literature with the purpose of formulating a project proposal.
		20ADC13.2	Develop the ability to identify and formulate problems by applying diverse technical knowledge skills.
		20ADC13.3	Apply the fundamental knowledge gained in the curriculum to model, design and implement a Data Science project.
		20ADC13.4	Build a prototype by choosing appropriate technologies to meet the identified requirements.
		20ADC13.5	Plan to work as a team and to focus on getting a working project done and submit a report within a stipulated period of time to the departmental Committee.
70	111/11	20EGC03 : E	EMPLOYABILITY SKILLS
		20EGC03.1	Become effective communicators, participate in groud discussions with confidence and be able to make presentations in a professional context.
		20EGC03.2	Write resumes, prepare and face interviews confidently passages confidently.



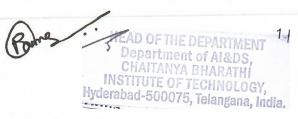
		20EGC03.3	Be assertive and set short term and long term goals, learn to manage time effectively and deal with stress.	
		20EGC03.4	Make the transition smoothly from campus to work, use media with etiquette and understand the academic ethics.	
		20EGC03.5	Enrich their vocabulary, frame accurate sentences and comprehend	
1	IV/I	20ADC14 : BIG	DATA ANALYTICS	
	1471	20ADC14.1	Understand the processing large datasets in Hadoop framework and Apply MapReduce architecture to solve real world problems.	
		20ADC14.2	Develop scripts using Pig over large datasets and query using Hive.	
		20ADC14.3	Understand the fundamentals of Spark and the Scala programming.	
		20ADC14.4	Expertise in using Resilient Distributed Datasets (RDD) for creating applications in Spark and query using SparkSQL.	
		20ADC14.5	Understand NoSQL databases and Develop data models using MongoDB.	
72	IV/I	20ITE15: UNMANNED AERIAL VEHICLES (Professional Elective - 4)		
12	1071	20ITE15.1	Identify the parts and functions of UAV and drones	
		20ITE15.2	Demonstrate the concepts of Aerodynamics, Propulsion & Structures of Model Aircrafts	
		20ITE15.3	Determine the payload and its corresponding propeller's RPM to successfully fly the drone	
		20ITE15.4	Design a drone with an automatic recovery mechanism.	
		20ITE15.5	Understand Navigation of UAV.	
73	IV/I		ROBOTIC PROCESS AUTOMATION (Professional Elective – 4)	
, 5		20ADE10.1	To Understand the basic concepts of RPA	
		20ADE10.2	To Describe various components and platforms of RPA	
		20ADE10.3	To Describe the different types of variables, control flow an data manipulation techniques	
		20ADE10.4	To Understand various control techniques and OCR in RPA	
		20ADE10.5	To Describe various types and strategies to handle exception	
	IV/I		BUSINESS INTELLIGENCE (Professional Elective – 4)	





		20ADE11.1	Understand the concepts and components of Business Intelligence (BI) and Decision support systems.	
		20ADE11.2	Analyze how BI will help an organization and whether it will help yours.	
		20ADE11.3	Identify the technological architecture that makes up BI systems	
		20ADE11.4	Use the tools that make up BI (data science).	
		20ADE11.5	Plan the implementation of a BI system	
75	IV/I	20ADE12 : SE	RVERLESS COMPUTING (Professional Elective – 4)	
		20ADE12.1	Understand the evolution of computing and architectures.	
		20ADE12.2	Summarize the requirements of serverless computing.	
		20ADE12.3	Develop event driven applications.	
		20ADE12.4	Use AWS Lambda for serverless applications.	
		20ADE12.5	Develop Functions for serverless applications in AWS Lambda	
76	IV/I	20ITE26 : DIGITAL FORENSICS (Professional Elective - 4)		
		20ITE26.1	Describe digital forensics and relate it to an investigative process.	
		20ITE26.2	Explain the legal issues of preparing for and performing digital forensic analysis based on the investigator's position and duty.	
		20ITE26.3	Interpret the cyber pieces of evidence, Digital forensic process model and their legal perspective.	
		20ITE26.4	Demonstrate various forensic tools to investigate the cybercrime and to identify the digital pieces of evidence.	
	7	20ITE26.5	Analyze the digital evidence used to commit cyber offenses.	
77	IV/I	20ADE13 : R	EINFORCEMENT LEARNING (Professional Elective – 4)	
		20ADE13.1	Explain the fundamental concepts of reinforcement learning and finite markov decision process.	
		20ADE13.2	Design a Reinforcement Learning system that knows how to make automated decisions	
		20ADE13.3	Illustrate the integration of model-based and model-fre methods.	
		20ADE13.4	Analyze how a learning algorithm can be implemented in different ways to obtain computational advantages.	

			Discuss parallels between reinforcement learning and neuroscience	
	IV/I	20EGMO3 : UNI	VERSAL HUMAN VALUES-II: UNDERSTANDING HARMONY	
8	10/2	20EGMO3.1	Students are expected to become more aware of themselves, and their surroundings (family, society, nature)	
		20EGMO3.2	They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.	
	+	20EGMO3.3	They would have better critical ability.	
		20EGMO3.4	They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).	
		20EGMO3.5	It is hoped that they would be able to apply what they have learnt to their own self in different day-today settings in real life, at least a beginning would be made in this direction.	
79	IV/I	20EGMO4 : GENDER SENSITIZATION		
		20EGMO4.1	Understand the difference between "Sex" and "Gender" and be able to explain socially constructed theories of identity.	
		20EGMO4.2	Recognize shifting definitions of "Man" and "Women" in relation to evolving notions of "Masculinity" and "Femininity".	
		20EGMO4.3	Appreciate women's contributions to society historically, culturally and politically.	
		20EGMO4.4	Analyze the contemporary system of privilege and oppressions, with special attention to the ways gender intersects with race, class, sexuality, ethnicity, ability, religion, and nationality.	
		20EGMO4.5	Demonstrate an understanding of personal life, the workplace, the community and active civic engagement through classroom learning.	
80	IV/I	20ADC15 : B	IG DATA ANALYTICS LAB	
		20ADC15.1	Explain Hadoop working environment and develop applications using MapReduce framework.	
		20ADC15.2	Develop scripts using Pig to solve real world problems and query the datasets using Hive.	
		20ADC15.3	Develop applications in Spark environment using RDDs.	
		20ADC15.4	Query real time data using SparkSQL.	
		20ADC15.5	Query large datasets using NoSQL.	

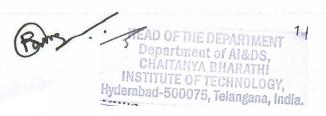


81	IV/I	20ADC16 : PR	OJECT PART-I
		20ADC16.1	Identify problem from literature survey in his/her area of interest
		20ADC16.2	Formulate possible solutions for the selected problem and compare with existing ones
		20ADC16.3	Prepare synopsis of the selected problem
on has the or or did by the book of	a contrate security security and a contrate section of the contrate section of	20ADC16.4	Gather the required information to set up the environment for the implementation of preliminary experimentation
		20ADC16.5	Communicate the work effectively in both oral and written forms
82	IV/I	20MEO03 : R	ESEARCH METHODOLOGIES (Open Elective-1)
		20MEO03.1	Define research problem.
		20MEO03.2	Review and assess the quality of literature from various sources.
		20MEO03.3	Understand and develop various research designs.
		20MEO03.4	Analyze problem by statistical techniques: ANOVA,F-test,Chi-square.
		20MEO03.5	Improve the style and format of writing a report for technical paper/Journal report.
83	IV/I	20MEO12:31	PRINTING (Open Elective-1)
	I E Mu =	20MEO12.1	Understand the concept of 3D printing processes, advantages and limitations.
		20MEO12.2	Evaluate real-life scenarios and recommend the appropriate 3D printing technology.
		20MEO12.3	Analyze various pre-processing and post processing techniques.
		20MEO12.4	Explain current and emerging 3D printing technologies in diversified applications.
		20MEO12.5	Identify components required in construction of 3Dprinter.
84	IV/I	20MEO15 : PI	RINCIPLES OF INDUSTRY 4.0 (Open Elective-1)
		20MEO15.1	Understand the Basics and applications of Digital Manufacturing and Industry 4.0.
		20MEO15.2	Understand the role of Additive Manufacturing, Virtual prototyping and Reverse Engineering processes and their adaptability to Digital Manufacturing.





		20MEO15.3	Understand the concepts of digital manufacturing based product life cycle and its management.	
		20MEO15.4	Understand the concept of Industry 4.0 and allied technologies.	
		20MEO15.5	Understand the basics of Internet of things and cloud computing pertaining the fourth industrial revolution.	
85	IV/I	20ECO14: NEURAL NETWORKS AND FUZZY LOGIC (Open Elective-1)		
		20ECO14.1	Understand the principles of Neural Networks and Fuzzy Logic fundamentals.	
		20ECO14.2	Apply the basic concepts to model the Neural Networks and Fuzzy Logic systems.	
		20ECO14.3	Compare the Neural Network based systems and Fuzzy Logic based systems.	
		20ECO14.4	Analyze Fuzzy Logic controllers and its applications.	
		20ECO14.5	Explain the concepts of Fuzzy target tracing control systems.	
86	IV/I	20EGO01: TECHNICAL WRITING SKILLS (Open Elective-1)		
		20EGO01.1	Communicate effectively, without barriers and understand aspects of technical communication.	
		20EGO01.2	Differentiate between general writing and technical writing and write error free sentences using technology specific words	
		20EGO01.3	Apply techniques of writing in business correspondence and in writing articles.	
		20EGO01.4	Draft technical reports and technical proposals.	
		20EGO01.5	Prepare agenda and minutes of a meeting and demonstrate effective technical presentation skills.	
87	IV/II	20ADC17: TECHNICAL SEMINAR		
		20ADC17.1	Collect Organize, Analyze and Consolidate information about emerging technologies from the literature.	
	j	20ADC17.2	Exhibit effective communication skills, stage courage, and confidence.	
		20ADC17.3	Demonstrate intrapersonal skills.	
		20ADC17.4	Explain new innovations/inventions in the relevant field.	
		20ADC17.5	Prepare Seminar Report in a prescribed format.	
88	IV/II	20ADC18 : PROJECT PART-2		



		20ADC18.1	Demonstrate a sound technical knowledge of their selected topic.
		20ADC18.2	Conduct investigations by using research-based knowledge and methods to provide valid conclusions.
		20ADC18.3	Provide solutions to societal complex problems utilizing gained engineering knowledge as an individual or by team work.
		20ADC18.4	Create/select/use modern tools to overcome the limitation of complex engineering solutions.
		20ADC18.5	Communicate with engineering experts and the community at large in written and oral forms.
89	IV/II	20MEO04: PRINCIPLES OF ENTREPRENEURSHIP (Open Elective-2)	
89	14/11	20MEO04.1	Understand the concept and essence of entrepreneurship.
		20MEO04.2	Identify business opportunities and nature of enterprise.
		20MEO04.3	Analyze the feasibility of new business plan.
		20MEO04.4	Apply project management techniques like PERT and CPM for effective planning and execution of projects.
		20MEO04.5	Use behavioral, leadership and time management aspects in entrepreneurial journey
90	IV/II	20BTO04 : BI	O-INFORMATICS (Open Elective-2)
,		20BT004.1	Explain the basic concepts of biology and bioinformatics.
		20BTO04.2	Identify various types of biological databases used for the retrieval and analysis of the information.
		20BTO04.3	Explain the sequence analysis and data mining.
		20BTO04.4	Discuss the methods used for sequence alignment an construction of the phylogenetic tree.
		20BTO04.5	Describe the methods used for gene and protein structur prediction.
91	IV/II	20MEO10: INTRODUCTION TO OPERATIONS RESEARCH (OE-2)	
		20MEO10.1	Understand the concepts of linear programming problem.
		20MEO10.2	Solve the given transportation problem.
		20MEO10.3	Develop optimum pair of operations and resources by usin assignment technique.
		20MEO10.4	Analyze project management techniques like CPM and PEF to plan and execute projects successfully.
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		20MEO10.5	Apply sequencing concepts for industry applications.	
92	IV/II	20ECO06 : PRINCIPLES OF VLSI (Open Elective-2)		
		20ECO06.1	Understand characteristic behavior of MOSFET	
		20ECO06.2	Describe various MOS layers and layout design rules.	
		20ECO06.3	Implement various CMOS logic circuits.	
		20ECO06.4	Design various MOS memories.	
		20ECO06.5	Understand the concepts of VLSI technology.	
93	IV/II	ERGY CONSERVATION (Open Elective-2)		
		20EEO04.1	Know the current energy scenario and importance of energy conservation.	
		20EE004.2	Understand the concepts of energy conservation.	
		20EE004.3	Evaluate the performance of existing engineering systems.	
		20EE004.4	Explore the methods of improving energy efficiency in different engineering systems.	
		20EEO04.5	Understanding different energy efficient devices.	
94	IV/II	20MTO03: QUANTUM COMPUTING (Open Elective-3)		
		20MTO03.1	Compute basic mathematical operations on Quantum bits.	
		20MT003.2	Will be able to execute Quantum operations of Quantum computing	
		20MTO03.3	To built quantum programs	
		20MTO03.4	Develop quantum Logical gates and circuits.	
		20MTO03.5	Develop the quantum algorithm	
95	IV/II	20MEO07: INTELLECTUAL PROPERTY RIGHTS (Open Elective-3)		
		20MEO07.1	Understand the evolution of IP, working of organization's at global level to protect and promote IP.	
		20MEO07.2	Familiarize with the patent filing process at national and international level.	
1		20MEO07.3	Draw the logical conclusion of research, innovation and patent filing.	
		20MEO07.4	Compare different kinds of IP and their patenting system.	
		20MEO07.5	Understand the techno-legal-business angle of IP, infringement and enforcement mechanisms forprotection.	



96	IV/II	20ECO01: REMOTE SENSING and GIS (Open Elective-3)	
		20EC001.1	Demonstrate the understanding of basic concepts of remote sensing and interpret energy interactions.
		20ECO01.2	Choose an appropriate technique for a given scenario by appreciating the types of remote sensing.
		20ECO01.3	Distinguish the principle behind the working of microwave and LiDAR sensing.
		20ECO01.4	Apply Microwave remote sensing techniques
		20ECO01.5	Explain the procedure for encoding data and geospatial data analysis.
97	IV/II	20CEO02: DISASTER RISK REDUCTION AND MANAGEMENT (OE-3)	
NG 26,	w wante	20CEO02.1	Identify and understand the concepts of hazards, causes and impacts of disasters.
		20CEO02.2	Develop a critical capacity to evaluate the principles and practices of disaster risk reduction and management.
		20CEO02.3	Develop a deep awareness of disaster resilience, risk mitigation, and recovery policies as they arise from natural hazards around the globe.
		20CEO02.4	Apply knowledge about existing global frameworks and existing agreements and role of community in successful Disaster Risk Reduction.
		20CEO02.5	Evaluate DM study including data search, analysis and presentation as a case study.
	IV/II	20BTO05 : CO	GNITIVE NEURO SCIENCE (Open Elective-3)
		20BTO05.1	Gain familiarity and basic knowledge about brain systems and functions.
		20BTO05.2	Understand brain's neuro-transimitter system.
		20BTO05.3	Understanding the brain's methods gives rise to behaviour whether we engage in any activity (e.g., walking, talking, etc.)
		20BTO05.4	Identify the patterns of varied activities in neurons that correspond to a person's attempts to move in particular ways.
		20BTO05.5	Understand the feedback system and brain disorders.

