Department of Artificial Intelligence & Data Science
Regulation 2020 Course Syllabus

Vision:

An active and committed centre of advanced learning focused on research and training in the fields of Engineering, Technology and Management to serve the nation better.

Mission:

M1	To develop eminent scholar with a lifelong, follow up of global standards by offering UG,PG and Doctoral Programmers.
M2	To pursue Professional and Career growth by collaborating mutually beneficial partnership with industries and higher institutes of research.
M3	To promote sustained research and training with emphasis on human values and leadership qualities.
M4	To contribute solutions for the need based issues of our society by proper ways and means as dutiful citizen.

Program Educational Objectives(PEOs)

PEO 1	Graduates will have the ability to adapt, contribute and innovate new technologies and systems in the key domains of Artificial Intelligence and Data Science.
PEO 2	Graduates will be able to successfully pursue higher education in reputed institutions with AI Specialization
PEO 3	Graduates will have the ability to explorer search area sandproduceoutstanding contribution in various areas of Artificial Intelligence and Data science

Program Outcomes(POs)

PO	Graduate Attribute
PO1	**Engineeringknowledge:**Applytheknowledgeofmathematics,science,engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

PO3	**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 the cultural, societal, and Environmental considerations.
PO4	**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.
PO5	**Moderntoolusage:**Create,select,andapplyappropriatetechniques,resourcesand modernengineeringandITtoolsincludingpredictionandmodelingtocomplex engineering activities with an understanding of the limitations.
PO6	**Theengineerandsociety:**Applyreasoninginformedbythecontextualknowledgeto assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**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.
PO8	**Ethics:**Applyethicalprinciplesandcommittoprofessionalethicsandresponsibilities and norms of the engineering practice.
PO9	**Individualandteamwork:**Functioneffectivelyasanindividual,andasamemberor leader in diverse teams, and in multidisciplinary settings
PO10	**Communication:**Communicateeffectivelyoncomplexengineeringactivitieswiththe engineering community and with society atlarge ,such as ,being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
PO11	**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.
PO12	**Life-longlearning:**Recognizetheneedfor,andhavethepreparationandabilityto engage in independent and life-long learning in the broadest context of technological change.

PROGRAMSPECIFICOUTCOMES(PSOs)

Program Specific Outcomes (PSOs):

PSO1	Tocollectrequirements,analyze,design,implementandtestsoftwareSystems.
PSO2	To analyze the errors and debug them accordingly
PSO3	To impart the Knowledge to implement AI Programming

Course Outcomes(COs) of All Courses. Autonomous Regulation

–R2020

SEMESTER I

SL.NO	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	TOTAL	CREDITS
1	HS8151	Communicative English	HS	4	0	0	60	4
2	MA8151	Engineering Mathematics I	BS	4	0	0	60	4
3	PH8151	Engineering Physics	BS	3	0	0	45	3
4	CY8151	Engineering Chemistry	BS	3	0	0	45	3
5	GE8151	Problem Solving & Python Programming	ES	3	0	0	45	3
6	GE8152	Engineering Graphics	ES	2	0	4	90	4
Practical								
7	GE8161	Physics & Chemistry Lab	BS	0	0	4	60	2
8	GE8162	Python Lab	ES	0	0	4	60	2
9	HS8161	English Lab	HS	0	0	2	30	1

SEMESTER II

SL.NO	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	TOTAL	CREDITS
1	HS8251	Technical English	HS	4	0	0	60	4
2	MA8251	Mathematics II	BS	4	0	0	60	4
3	BE8251	Basic Electrical & Electronics Engg	ES	3	0	0	45	3
4	GE8251	Engineering Mechanics	ES	3	1	0	60	4
5	CS8251	Programming in C	PC	3	0	0	45	3
6	GE8291	Environmental Science	BS	2	0	0	30	2
7								

SEMESTER I

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK (L-T-P)	TOTAL CONTACT PERIODS	CREDITS
1	U20HS101	Communicative English	HS	3-0-0	45	3
2	U20MA101	Engineering Mathematics	BS	3-1-0	60	4
3	U20PH101	Engineering Physics – I	BS	3-0-0	45	3
4	U20CY101	Engineering Chemistry	BS	3-0-0	45	3
5	U20GE101	C Programming	ES	3-0-0	45	3
6	U20GE102	Engineering Graphics	ES	2-0-4	90	4
7	U20BS101	Physics and Chemistry laboratory	BS	0-0-4	60	2
8	U20GE103	C Programming Laboratory	ES	0-0-4	60	2
Total						**24**

SEMESTER II

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK (L-T-P)	TOTAL CONTACT PERIODS	CREDITS
1	U20HS201	Functional English	HS	3-0-0	45	3
2	U20MA201	Advanced Calculus and Ordinary Differential Equations	BS	3-1-0	60	4
3	U20PH201	Engineering Physics – II	BS	3-0-0	45	3
4	U20GE201	Python Programming	ES	3-0-0	45	3
5	U20CS201	Data Structures and algorithms	PC	3-0-0	45	3
6	U20EC201	Semiconductor devices	ES	3-0-0	45	3
7	U20GE203	Engineering Practices Laboratory	ES	0-0-4	60	2
8	U20GE204	Python Programming Laboratory	ES	0-0-4	60	2
9	U20CS202	Data Structures and Algorithms Laboratory	PC	0-0-4	60	2
Total						**25**

SEMESTER III

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK (L-T-P)	TOTAL CONTACT PERIODS	CREDITS
1	U20MA301	Mathematical Foundation of Computer Science	BS	3-1-0	60	4
2	U20AI301	Database Management Systems	PC	3-0-0	45	3
3	U20EC301	Digital Systems	ES	3-1-0	60	4
4	U20AI302	Computer Architecture and Organization	PC	3-0-0	45	3
5	U20AI303	Object Oriented Programming	PC	3-0-0	45	3
6	U20AI304	Database Management Systems Laboratory	PC	0-0-4	60	2
7	U20CS305	Object Oriented Programming with Java Laboratory	PC	0-0-4	60	2
Total						**21**

SEMESTER IV

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK (L-T-P)	TOTAL CONTACT PERIODS	CREDITS
1	U20AI401	Computer Networks	PC	3-0-0	45	3
2	U20AI402	Design and Analysis of Algorithms	PC	3-0-0	45	3
3	U20AI403	Operating Systems	PC	3-0-0	45	3

4	U20AI404	Digital Image Processing	PC	3-0-0	45	3
5	U20HS202	Environmental Science and Engineering	HS	3-0-0	45	3
6	U20AI405	Operating Systems Laboratory	PC	0-0-4	60	2
7	U20AI406	Computer Networks Laboratory	PC	0-0-4	60	2
Total						**19**

SEMESTER V

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK (L-T-P)	TOTAL CONTACT PERIODS	CREDITS
1	U20MA501	Random Process and Statistics	BS	3-1-0	60	4
2	U20AI501	Theory of Computation	PC	3-1-0	60	4
3	U20AI502	Artificial Intelligence and Machine Learning	PC	3-0-0	45	3
4	U20AI503	Software Engineering	PC	3-0-0	45	3
5	—	Open Elective-I	OE	3-0-0	45	3
6	—	Professional Elective-I	PE	3-0-0	45	3
7	U20HS301	Interpersonal Skills / Listening & Speaking	EEC	0-0-2	15	1
8	U20AI504	Artificial Intelligence Laboratory	PC	0-0-3	45	2
9	U20AI505	Machine Learning Laboratory	PC	0-0-3	45	2
Total						**25**

SEMESTER VI

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK (L-T-P)	TOTAL CONTACT PERIODS	CREDITS
1	U20AI601	Data Warehousing and Data Mining	PC	3-0-0	45	3
2	U20AI602	AI Knowledge Representation and Reasoning	PC	3-0-0	45	3
3	U20AI603	Foundation of Data Science	PC	3-0-0	45	3
4	U20AI604	Deep Learning	PC	3-0-0	45	3
5	—	Open Elective- II	OE	3-0-0	45	3
6	—	Professional Elective-II	PE	3-0-0	45	3
7	U20AI605	Data Mining Tools Laboratory	PC	0-0-4	60	2
8	—	Mini Project	EEC	0-0-2	30	2
Total						**22**

SEMESTER VII

SL.	COURSE	COURSE TITLE	CATEGORY	PERIODS PER	TOTAL CONTACT	CREDITS

NO.	CODE			WEEK (L-T-P)	PERIODS	
1	U20AI701	Big Data Analytics	PC	3-0-0	45	3
2	U20AI702	Internet of Things	PC	3-0-0	45	3
3	U20AI703	Natural Language Processing	PC	3-1-0	60	4
4	U20AI704	Data Visualization Techniques	PC	3-0-0	45	3
5	—	Professional Elective-III	PE	3-0-0	45	3
6	U20AI705	Internet of Things laboratory	PC	0-0-4	60	2
7	U20AI706	Data Analytics lab	PC	0-0-4	60	2
Total						**20**

SEMESTER VIII

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK (L-T-P)	TOTAL CONTACT PERIODS	CREDITS
1	—	Professional Elective IV	PE	3-0-0	45	3
2	—	Professional Elective V	PE	3-0-0	45	3
3	—	Project Work	EEC	0-0-12	180	6
Total						**12**

Semester I

U20HS101 – Communicative English

- **CO1** – Speak clearly, effortlessly, confidently and appropriately.
- **CO2** – Write coherently with acceptable accuracy, organizing ideas logically.
- **CO3** – Listen and comprehend different discourses and genres of texts.
- **CO4** – Read and comprehend different discourses and genres of texts.
- **CO5** – Read and infer, analyze, predict, interpret and draw conclusions any printed text.

U20MA101 – Engineering Mathematics

- **CO1** – Express large amounts of data and functions in an organized and concise form apart from diagonalizing matrices.
- **CO2** – Solve maxima and minima problems using differentiation.
- **CO3** – Apply functions of several variables to solve problems in engineering and technology.
- **CO4** – Evaluate integrals by using Fundamental Theorem of Calculus.
- **CO5** – Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change the order and change of variables.

U20PH101 – Engineering Physics – I

- **CO1** – Assess the elastic behavior of the materials and bending behavior of beam.
- **CO2** – Acquire knowledge of NDT and applications of ultrasonics.
- **CO3** – Know the development of modern physics and its applications.

- **CO4** – Recognize the uses of laser and fiber optics.
- **CO5** – Distinguish the different crystal systems, structural determination and synthesis of crystals.

U20CY101 – Engineering Chemistry

- **CO1** – Describe the General Structure of Polymers and explain differences between Addition and Stepwise Polymerization.
- **CO2** – Explain how selected Isomers could be used for measurement of Surface Area of Materials or in Rationalization of Catalysis.
- **CO3** – Derive and discuss the First and Second Laws of Thermodynamics.
- **CO4** – Apply this knowledge in different areas other than Photo Chemistry and Spectroscopy.
- **CO5** – Illustrate the Phase Transition of One Component and Two Component systems and types of Alloys and their applications in industries.

U20GE101 – C - Programming

- **CO1** – Develop simple applications in C using basic constructs.
- **CO2** – Design and implement applications using arrays and strings.
- **CO3** – Develop and implement applications in C using functions and pointers.
- **CO4** – Develop applications in C using structures.
- **CO5** – Design applications using sequential and random access file processing.

U20GE102 – Engineering Graphics

- **CO1** – Familiarize with the fundamentals and standards of Engineering graphics.
- **CO2** – Perform freehand sketching of basic geometrical constructions and multiple views of objects.
- **CO3** – Project orthographic projections of lines and plane surfaces.
- **CO4** – Draw projections of solids and development of surfaces.
- **CO5** – Visualize and project isometric and perspective sections of simple solids.

Semester I Practical Subjects U20BS101 – Physics and Chemistry Laboratory

- **CO1** – Apply the basic theory for the corresponding experiment.
- **CO2** – Know the procedure to use physics equipment.
- **CO3** – Utilize hands-on knowledge in the quantitative chemical analysis of water quality related parameters.
- **CO4** – Utilize the fundamental laboratory techniques for analyses such as titrations, separation, purification and spectroscopy.

U20GE103 – C - Programming Laboratory

- **CO1** – Develop C programs for simple applications making use of basic constructs, arrays and strings.
- **CO2** – Develop C programs involving functions, recursion, pointers, and structures.
- **CO3** – Design applications using sequential and random access file processing.

Semester II
U20HS201 – Functional English

- **CO1** – Use academic and technical vocabulary in relevant contexts and construct meaningful and grammatically correct sentences.
- **CO2** – Effectively listen and acquire language and content, read fast and understand texts.
- **CO3** – Use oral presentation skills in all professional contexts.
- **CO4** – Demonstrate understanding of the nature and importance of technical communication and draft business documents like reports, proposals and letters.

- **CO5** – Compose documents like job applications and book reviews.

U20MA201 – Advanced Calculus and Ordinary Differential Equations

- **CO1** – Evaluate the effective mathematical tools to obtain solutions of first and second order differential equations that model physical processes.
- **CO2** – Express Gradient, divergence and curl of a vector point function and evaluate line, surface and volume integrals using Gauss, Stokes and Green's theorems.
- **CO3** – Apply tools of differentiation and integration of complex variables used in engineering problems.
- **CO4** – Express Analytic functions, conformal mapping and complex integration.
- **CO5** – Solve Laplace transform and inverse transform of simple functions and apply them to differential equations with constant coefficients.

U20PH201 – Engineering Physics - II

- **CO1** – Select the metals required for specific applications in the area of engineering and technology.
- **CO2** – Distinguish between different types of semiconductors and determine the Hall co-efficient.
- **CO3** – Understand the property of dielectric and ferroelectric materials.
- **CO4** – Identify different magnetic materials and superconducting materials.
- **CO5** – Understand the ideas used in new technologies.

U20GE201 – Python Programming

- **CO1** – Develop algorithmic solutions to simple computational problems.
- **CO2** – Decompose a Python program into functions.
- **CO3** – Implement database and GUI applications.
- **CO4** – Represent compound data using Python lists, tuples, and dictionaries.
- **CO5** – Read and write data from/to files in Python programs.

U20CS201 – Data Structure and Algorithms

- **CO1** – Derive time and space complexities and justify the correctness of a given algorithm.
- **CO2** – Compare the performances of various Searching and Sorting techniques.
- **CO3** – Create ADTs and demonstrate applications of Stacks and Queues.
- **CO4** – Demonstrate the advantages of dynamic memory allocation via linked lists.
- **CO5** – Illustrate different types of Trees and Graph structures and implement search and traversal algorithms.

U20EC201 – Semiconductor Devices

- **CO1** – Gain confidence in handling and usage of electronic devices, tools and instruments.
- **CO2** – Know broadly the concepts and functionalities of electronic devices.
- **CO3** – Understand use, general specifications and deployability of electronic assemblies.
- **CO4** – Operate basic electronic devices such as PN junction diodes, Bipolar and Field effect Transistors.
- **CO5** – Understand concepts on Power control devices, LED, LCD and other Opto-electronic devices.

Semester II Practical Subjects U20GE203 – Engineering Practices Laboratory

- **CO1** – Fabricate carpentry components and pipe connections including plumbing works.
- **CO2** – Use welding equipment to join structures.
- **CO3** – Carry out basic machining operations.
- **CO4** – Make models using sheet metal works.
- **CO5** – Illustrate centrifugal pumps, air conditioners, and operations of smithy, foundry and fittings.
- **CO6** – Carry out basic home electrical works and measure electrical quantities.

U20GE204 – Python Programming Laboratory

- **CO1** – Compile and execute simple Python programs.
- **CO2** – Implement mathematical calculations in programs.
- **CO3** – Develop Python programs step-wise by defining and calling functions.
- **CO4** – Use Python lists, tuples, and dictionaries for representing compound data.
- **CO5** – Execute simulation of pygame programs.

U20CS202 – Data Structures Laboratory

- **CO1** – Write functions to implement Linear and Non-Linear Data structure operations.
- **CO2** – Suggest and use appropriate Linear / Non-Linear Data Structure operations for solving a given problem.
- **CO3** – Apply appropriate hash functions that result in a collision-free scenario for data storage and retrieval.

Semester III
U20MA301 – Mathematical Foundation of Computer Science

- **CO1** – Demonstrate skills in solving mathematical problems.
- **CO2** – Comprehend mathematical principles and logic.
- **CO3** – Understand the mathematical and logical basis of modern technology.
- **CO4** – Solve problems using basic Graph Theory.
- **CO5** – Design discrete problems to be solved by computers.

U20AI301 – Database Management Systems

- **CO1** – Classify modern database applications based on size and complexity.
- **CO2** – Map ER models to Relational models effectively.
- **CO3** – Write queries using normalization criteria and optimize them.
- **CO4** – Compare and contrast various indexing strategies.
- **CO5** – Appraise how advanced databases differ from traditional ones.

U20EC301 – Digital Systems

- **CO1** – Simplify Boolean functions using K-Map.
- **CO2** – Design and analyze Combinational and Sequential Circuits.
- **CO3** – Implement designs using Programmable Logic Devices.
- **CO4** – Write HDL code for combinational and Sequential Circuits.

U20AI302 – Computer Architecture and Organization

- **CO1** – Design arithmetic and logic units.
- **CO2** – Design and analyze pipelined control units.
- **CO3** – Evaluate performance of memory systems.
- **CO4** – Understand parallel processing architectures.

U20AI303 – Object Oriented Programming

- **CO1** – Gain basic knowledge on Object Oriented concepts.
- **CO2** – Develop applications using OOP concepts to solve real-world problems.
- **CO3** – Acquire knowledge of programming languages and OOP concepts.

Semester III Practical Subjects U20AI304 – Database Management Systems Laboratory

- **CO1** – Design and implement a database schema for a given problem-domain.
- **CO2** – Populate and query a database.
- **CO3** – Create and maintain tables using PL/SQL.
- **CO4** – Prepare reports.

U20CS305 – Object Oriented Programming with Java Laboratory

- **CO1** – Gain basic knowledge on Object Oriented concepts.
- **CO2** – Develop applications using OOP concepts.
- **CO3** – Implement features of OOP to solve real-world problems.

Semester IV

U20AI401 – Computer Networks

- **CO1** – Understand basic layers and their functions in computer networks.
- **CO2** – Evaluate the performance of a network.
- **CO3** – Understand how data flows from one node to another.
- **CO4** – Analyze and design routing algorithms and protocols.
- **CO5** – Understand the working of various application layer protocols.

U20AI402 – Design and Analysis of Algorithms

- **CO1** – Classify algorithmic problem-solving methods based on Data Structures.
- **CO2** – Analyze algorithm efficiency using mathematical notations.
- **CO3** – Develop different types of sorting and searching algorithms.
- **CO4** – Analyze different techniques in the design of Graph Algorithms.
- **CO5** – Differentiate algorithm design techniques of NP-complete and NP-hard problems.

U20AI403 – Operating System

- **CO1** – Analyze various scheduling algorithms.
- **CO2** – Understand deadlock prevention and avoidance algorithms.
- **CO3** – Compare and contrast various memory management schemes.
- **CO4** – Understand the functionality of file systems.

U20AI404 – Digital Image Processing

- **CO1** – Understand fundamentals of digital image processing, including sampling and 2D-transforms.
- **CO2** – Operate on images using smoothing, sharpening, and enhancement techniques.
- **CO3** – Understand restoration concepts and filtering techniques.
- **CO4** – Learn basics of segmentation, feature extraction, and compression for color models.

U20HS202 – Environmental Science and Engineering

- **CO1** – Develop public awareness of the environment at an early stage.
- **CO2** – Identify how ignorance and incomplete knowledge lead to misconceptions.
- **CO3** – Understand how development in standard of living can lead to serious environmental disasters.

Semester IV Practical Subjects U20AI405 – Operating Systems Laboratory

- **CO1** – Compare the performance of various CPU Scheduling Algorithms.
- **CO2** – Implement Deadlock avoidance and Detection Algorithms.

- **CO3** – Implement Semaphores and IPC.
- **CO4** – Analyze the performance of Page Replacement Algorithms.
- **CO5** – Implement File Organization and Allocation strategies.

U20AI406 – Computer Networks Laboratory

- **CO1** – Implement various protocols using TCP and UDP.
- **CO2** – Compare the performance of transport layer protocols using simulation tools.
- **CO3** – Analyze routing algorithms and implement error correction codes.

Semester V

U20MA501 – Random Process and Statistics

- **CO1** – Understand probability concepts and standard distributions for real-life phenomena.
- **CO2** – Apply the concepts of random variables and processes in engineering disciplines.
- **CO3** – Understand and apply the concept of correlation and spectral densities.
- **CO4** – Analyze the response of random inputs to linear time-invariant systems.

U20AI501 – Theory of Computation

- **CO1** – Construct automata and regular expressions for any pattern.
- **CO2** – Write Context-free grammar for any construct.
- **CO3** – Design Turing machines for any language and computation solution.

U20AI502 – Artificial Intelligence and Machine Learning

- **CO1** – Understand formal methods of knowledge representation, logic, and reasoning.
- **CO2** – Understand foundational mathematical tools and program paradigms of AI.
- **CO3** – Understand fundamental issues of machine learning, including paradigms of supervised and unsupervised learning.
- **CO4** – Apply intelligent agents for AI programming techniques.

U20AI503 – Software Engineering

- **CO1** – Compare and analyze various lifecycle models of software processes.
- **CO2** – Design an appropriate analysis model that suits requirements.
- **CO3** – Design software architecture models for various applications.
- **CO4** – Implement strategies for software testing.
- **CO5** – Estimate the cost of a project using appropriate methods.

Semester V Practical Subjects U20AI504 – Artificial Intelligence Laboratory

- **CO1** – Use appropriate search algorithms for any AI problem.
- **CO2** – Represent problems using first-order and predicate logic.
- **CO3** – Provide apt agent strategies to solve given problems.
- **CO4** – Design software agents and NLP applications using AI.

U20AI505 – Machine Learning Laboratory

- **CO1** – Apply classification and clustering techniques using tools like R and Python.
- **CO2** – Implement solutions for various prediction problems.
- **CO3** – Design and develop games and traffic control systems using reinforcement learning.

Semester VI
U20AI601 – Data Warehousing and Data Mining

- **CO1** – Become familiar with mathematical foundations of data mining tools.
- **CO2** – Implement classical models and algorithms in data warehouses and data mining.
- **CO3** – Characterize patterns discovered by association rule mining, classification, and clustering.

U20AI602 – AI Knowledge Representation and Reasoning

- **CO1** – Design intelligent agents for problem-solving, reasoning, and learning.
- **CO2** – Apply AI techniques to current applications.

U20AI603 – Foundation of Data Science

- **CO1** – Use tools to build data-science applications for different data types.
- **CO2** – Understand key concepts in data science, including approaches and scenarios.
- **CO3** – Understand topics in data processing at scale and data collection.

U20AI604 – Deep Learning

- **CO1** – Understand basics of deep learning and implement various models.
- **CO2** – Realign high-dimensional data using reduction techniques.
- **CO3** – Analyze optimization and generalization in deep learning.

Semester VI Practical Subjects U20AI605 – Data Mining Tools Laboratory

- **CO1** – Understand various kinds of data mining tools.
- **CO2** – Demonstrate classification and clustering in large datasets.
- **CO3** – Add mining algorithms as components to existing tools and apply them to realistic data.

Semester VII
U20AI701 – Big Data Analytics

- **CO1** – Work with big data tools and analysis techniques.
- **CO2** – Analyze data using clustering, classification, and recommendation systems.
- **CO3** – Perform analytics on data streams and learn NoSQL databases.

U20AI702 – Internet of Things

- **CO1** – Describe characteristics, designs, domains, and architecture of IoT.
- **CO2** – Differentiate M2M and IoT, and SDN and NFV design methodologies.

U20AI703 – Natural Language Processing

- **CO1** – Design innovative applications using NLP components.
- **CO2** – Implement rule-based systems to tackle language morphology and syntax.
- **CO3** – Design tag sets for statistical processing in real-time applications.
- **CO4** – Compare different statistical approaches for NLP applications.

U20AI704 – Data Visualization Techniques

- **CO1** – Explain principles of visual perception and apply skills for visual analysis.
- **CO2** – Apply visualization techniques for data analysis tasks and design dashboards.

Semester VII Practical Subjects U20AI705 – Internet of Things Laboratory

- **CO1** – Design and deploy IoT applications using Arduino/Raspberry Pi, sensors, and actuators.
- **CO2** – Build an IoT system using a mobile app as a mini-project.

U20AI706 – Data Analytics Laboratory

- **CO1** – Process big data using the Hadoop framework.
- **CO2** – Build linear and logistic regression models for data analysis.
- **CO3** – Perform graphical data analysis using machine learning methods.
