





# **Department of Artificial Intelligence** and **Data Science**

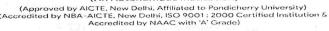
# Minutes of 6<sup>th</sup> BOS Meeting

**GD Hall, Training and Placement Cell** Sri Manakula Vinayagar Engineering College

21st July 2023 & 12:30 P.M

Sri Manakula Vinayagar Engineering College







# Department of Artificial Intelligence and Data Science Minutes of 6<sup>th</sup> Board of Studies

The Sixth Board of Studies meeting for Department of Artificial Intelligence and Data Science was held on 21st July 2023 at 12:30 P.M in the GD Hall, Training and Placement Cell, Sri Manakula Vinayagar Engineering College with the Head of the Department in the Chair.

The following members were present for the BoS meeting

SI.No	Name of the Member with Designation and official Address	Responsibility in the BoS
1	Dr. J. Madhusudanan, Professor and Head, Department of AI&DS, SMVEC.	Chairman
2	<b>Dr. M. Thangaraj,</b> Professor & Head, Madurai Kamaraj University, Madurai.	Subject Expert (Academic Council Nominee)
3	Dr. Chandra Mouli P.V.S.S.R, Associate Professor & Head Central University of Tamil Nadu, Tiruvarur, Tamil Nadu.	Subject Expert (Academic Council Nominee)
4	Dr. C. Muthu, Professor & Head, Loyola College, Chennai.	Subject Expert (University Nominee)
5	Dr. Mohanraj Vengadachalam, Machine Learning Lead, Standard Chartered GBS, Chennai.	Representative from Industry
6	Dr. J. Uthayakumar, Research Head, Genesys Academy, Puducherry.	Postgraduate Alumnus (nominated by the Principal)
7	Dr. M.Auxilia Associate Professor, Department of AI&DS, SMVEC	Internal Member
8	Mr. K.Pragash Assistant Professor, Department of AI&DS, SMVEC	Internal Member
tem <b>9</b> tve	Mr. R.Rajan Assistant Professor, Department of AI&DS, SMVEC	Internal Member
10	Prof. M. Ganesan Assistant Professor, Department of CSE, SMVEC	Internal Member

11	Prof. M. Shanmugam Assistant Professor, Department of CSE, SMVEC	Internal Member
12	Dr. T. Gayathri Professor, Department of Maths, SMVEC	Internal Member
13	Dr. R. Sivakumar Associate Professor, Dept. of MBA, SMVEC	Internal Member
14	Ms. K. Mathanavathi Assistant Professor, Dept. of English, SMVEC	Internal Member

# Agenda of the Meeting

- 1. Review of Fifth BoS
- 2. Approval of professional electives for semester VII (1 paper) and VIII (10 Papers)
- 3. Approval of new regulation R2023 for both B.Tech and M.Tech.
- 4. Approval of the curriculum for both B.Tech and M.Tech courses under R2023.
- 5. Approval of Semester I and Semester II papers for I year B. Tech under R2023
- 6. Approval of Semester I and Semester II papers for I year M. Tech under R2023
- 7. Showcasing achievements and placement details of our department
- 8. Any other item with the permission of chai

# **Minutes of the Meeting**

Dr. J. Madhusudanan, Chairman, BoS opened the meeting by welcoming and introducing the external members, to the internal and co-opted members and thanked them for accepting to become the member of the Board of Studies and the meeting thereafter deliberated on agenda items that had been approved by the Chairman.

# BOS/2022/AI&DS/UG/6.1 BOS/2022/AI&DS/UG/6.2

Discussed and approved the Fifth BoS

Professional Elective Syllabi and VIII semesters for the B.Tech – Artificial Intelligence and Data Science have been approved with the following suggestions (Given in Annexure I).

SI.No	Regulation	Semester	Subject Name with Code	Unit	Particulars
station of the state of the sta	R-2020	VII	Data Analytics with Power BI U20ADE716	- 0	The expert members are satisfied with the contents included in the syllabus.
2	R-2020	VIII	AI in Bioinformatics U20ADE821	-	The expert members are satisfied with

	l sado-1	Smaleki Lav Atu	olo Pa	55077			the contents included in the syllabus
117	3	Preprior Datable Datable Day on	R-2020	VIII	Al in Ecommerce	1 1 1 1 1	The expert members are satisfied with the contents
	Lilener.				U20ADE822		included in the syllabus
	4		R-2020	VIII	Ethical Hacking U20ADE823		Suggested to include defence mechanisms in any of the unit
	5		R-2020	VIII	Al in Agriculture U20ADE824	yall ad let an m teve	The expert members are satisfied with the contents included in the syllabus
- 1	6		R-2020	VIII	ML OPS U20ADE825		Suggested to add feedback loop mechanism in unit I
			R-2020	VIII	AI in Automobile Industry U20ADE826		The expert members are satisfied with the contents included in the syllabus. Real time demonstration can be given to students for collision detection
	8		R-2020	VIII	Al in Customer Service U20ADE827	-	The expert members are satisfied with the contents included in the syllabus
	9	f mily for the desirer		VIII	Al in Smart Cities U20ADE828	- 36	Suggested to procure hardware for real time demonstration
di Vin ak dia alia Ann aliy Dig ne		The expression of the control of the	R-2020	VIII	Healthcare Data Analytics U20ADE829		The expert members are satisfied with the contents included in the syllabus

11	R-2020	VIII	Al in Finance U20ADE830	The expert members are satisfied with the contents included in the syllabus					
BOS/2022/AI&DS/UG/6.	Discussed M.Tech	about the r	new regulation R2	023 for both B.Tech and					
BOS/2022/AI&DS/UG/6.		Discussed about the Approval of the curriculum for both B.Tech and M.Tech courses under R2023 (Given in Annexure II).  — Approved and Recommended to the A							
BOS/2022/AI&DS/UG/6.	Tech unde Accepted	Approval of Semester I and Semester II papers for I year B. Tech under R2023 Accepted the syllabus without any corrections, as most of the subjects are common (Given in Annexure III).							
BOS/2022/AI&DS/UG/6.0	Tech under Suggested the subject	Approval of Semester I and Semester II papers for I year M. Tech under R2023 Suggested to change course in M. Tech Curriculum such that the subjects taught in B. Tech is not repeated in M.Tech Curriculum (Given in Annexure III).							

SI.No	Regulation	Semester	Subject Name with Code	Unit	Particulars
1	R-2023	under and the second of the se	P23ADE205 Data Visualization Using Power BI	V	The expert members suggested to add case studies in the unit V
2	R-2023		P23ADE207 Next Generation Databases	All	The expert members suggested to add few advanced topics in all units
3	R-2023	II.	P23ADE213 Full Stack Development	IV	The expert members suggested to remove streaming concept in unit IV

BOS/2022/AIDS/UG/6.7	Showcased achievements and placement details of our department and the members appreciated the students and entire department.
BOS/2022/AIDS/UG/6.8	Got suggestions from the BoS Members for B.Tech honors degree and they approved the subjects.  Members have suggested few new courses to be added in the Employability Enhancement Courses

The meeting was concluded at 2.15 PM with vote of thanks by **Dr. J. Madhusudanan**, Head of Department, Artificial Intelligence and Data Science.

SI.No	Name of the Member with Designation and official Address	Responsibility in the BoS	Signature
1 8	Dr. J. Madhusudanan, Professor and Head, Department of AI&DS, SMVEC.	Chairman	丁.人\
2	Dr. M. Thangaraj, Professor & Head, Madurai Kamaraj University, Madurai.	Subject Expert	Jen -
3	Dr. Chandra Mouli P.V.S.S.R, Associate Professor & Head Central University of Tamil Nadu, Tiruvarur, Tamil Nadu.	Subject Expert	Jose Cladrame
4	<b>Dr. C. Muthu,</b> Professor & Head, Loyola College, Chennai.	Subject Expert	1 Naction
5	Dr. Mohanraj Vengadachalam, Machine Learning Lead, Standard Chartered GBS, Chennai.	Industrial Expert	7.00
6	Dr. J. Uthayakumar, Research Head, Genesys Academy, Puducherry.	Member	, Durton
7	Dr. M. Auxilia Associate Professor, Department of AI&DS, SMVEC	Internal Member	14.ful
8	Mr. K. Pragash Assistant Professor, Department of AI&DS, SMVEC	Internal Member	8m.j
9	Mr.R.Rajan Assistant Professor, Department of AI&DS, SMVEC	Internal Member	Q. Oojur
10	Prof. M. Ganesan Assistant Professor, Department of CSE, SMVEC	Internal Member	M. hames
11	Prof. M. Shanmugam Assistant Professor, Department of CSE, SMVEC	Internal Member	ellshary
12	Dr. T. Gayathri Professor, Department of Maths, SMVEC	Internal Member	T. gan

13	Dr. R. Sivakumar Associate Professor, Dept. of MBA, SMVEC	Internal Member	and Salt
14	Ms. Gajalakshmi Assistant Professor, Dept. of English, SMVEC	Internal Member	N-J

# Annexure – I (Revised VII and VIII Semester Professional Elective Curriculum)

	SEMESTER - V										
SI. No.	Course Code	Course Title									
Profes	ssional Elective	- IV (Offered in Semester VII)									
1	U20ADE716	Data Analytics with Power BI									
2	U20ADE717	Al Ethics									
3	U20ADE718	Image and Video Analytics									
4	U20ADE719	Social Network Analysis									
5	U20ADE720	Time Series Analysis and Forecasting									
Profes	ssional Elective	- V (Offered in Semester VIII)									
1	U20ADE821	Al in Bioinformatics									
2	U20ADE822	Al in Ecommerce									
3	U20ADE823	Ethical Hacking									
4	U20ADE824	AI in Agriculture									
5	U20ADE825	ML OPS									
Profes	ssional Elective	- VI (Offered in Semester VIII)									
1	U20ADE826	Al in Automobile Industry									
2	U20ADE827	Al in Customer Service									
3	U20ADE828	Al in Smart Cities									
4	U20ADE829	Healthcare Data Analytics									
5	U20ADE830	Al in Finance									

#### DATA ANALYTICS WITH POWER BI

L T P C Hrs 3 0 0 3 45

#### **Course Objectives**

The course will introduce the students to

- To understand the concept of data analytics and Power BI
- To understand the difference data transformation and data preparation
- To understand the data modelling using Power BI
- · To understand data visualization methods using charts
- · To understand the solving real world problems

#### **Course Outcomes**

After completion of the course, the students will be able to

- CO1 Learn the significance and need of data analysis and data visualization
- CO2 Understand the data cleaning and preprocessing frameworks
- CO3 Understand the DAX language for advanced calculations
- CO4 Implement dashboards using Power BI
- CO5 Apply data analytics for real world applications.

#### UNIT I INTRODUCTION TO DATA ANALYTICS AND POWER BI

(9 Hrs).

Overview of data analytics and its significance - Introduction to Power BI and its features - Data visualization and exploration using Power BI - Connecting to data sources in Power BI

#### UNIT II DATA PREPARATION AND TRANSFORMATION

(9 Hrs)

Data cleaning and pre-processing techniques in Power BI - Data shaping and transformation using Power Query-Merging, and combining data from multiple sources- Creating calculated columns and measures

#### **UNIT III DATA MODELLING AND ANALYSIS**

(9 Hrs)

Building data models in Power BI- relationships between tables - DAX (Data Analysis Expressions) language for advanced calculations- Aggregations and summarization techniques

#### UNIT IV ADVANCED DATA VISUALIZATION

(9 Hrs)

Creating interactive reports and dashboards in Power BI - customizing visualizations - and formatting options, using slicers and filters for data exploration - Implementing drill-down and drill-through functionality

#### UNIT V POWER BI AND BUSINESS PROBLEM SOLVING

(9 Hrs)

Solving real-world business problems using Power BI - analysing sales and marketing data - Forecasting and trend analysis - Identifying patterns and outliers - Data-driven decision-making and insights

#### **Text Books**

- 1. Suren Machiraju, Suraj Gaurav, "Power BI Data Analysis and Visualization", DelG Press, 1st edition, 2018
- 2. Brian Larson,"Data Analysis with Power BI", Mc Graw Hill, 1st edition, 2020
- 3. Dan Clark,"Beginning Microsoft Power BI", Apress, 3rd Edition, 2020.

#### Reference Books

- Brett Powell, "Power BI Cookbook: Creating Business Intelligence Solutions of Analytical Data Models, Reports, and Dashboards", 2017
- 2. Nicole LaBlanc, "Learn Power BI: A Beginner's Guide to Analyzing Data and Creating Business Intelligence Dashboards", 2018
- 3. Teo Lachev and Edward Price, "Applied Microsoft Power BI: Bring your data to life!", 2017
- 4. Brett Powell, "Mastering Microsoft Power BI: Expert Techniques for Effective Data Analytics and Business Intelligence". 2018
- 5. Alberto Ferrari and Marco Russo, "Analyzing Data with Power BI and Power Pivot for Excel", 2017

#### Web References

- 1. https://powerbi.microsoft.com/en-us/documentation/
- 2. https://community.powerbi.com/)
- 3. https://powerbi.microsoft.com/en-us/blog/
- 4. https://radacad.com/category/power-bi
- 5. https://www.sqlbi.com/

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#### AI IN BIOINFORMATICS

U20ADE821

L T P C Hrs 3 0 0 3 45

#### **Course Objectives**

- To learn about Bioinformatics Basics.
- · To understand the concept of Sequence alignment and analysis
- To learn various concepts of Genomics and functional annotation
- To understand the concepts of structural bioinformatics
- To understand various applications of genomics and drug discovery in artificial intelligence

#### **Course Outcomes**

After completion of the course, the students will be able to

CO1 – Understand the Bioinformatics concepts

CO2 – Understand the sequence analysis fundamentals and alignment algorithms

CO3 - Understand the Genomic data, gene predictions algorithms, and functional annotation tools

CO4 - Understand the protein structure fundamentals

CO5 – Understand the Genomic data analysis and drug target identification.

#### UNIT I - INTRODUCTION TO AI IN BIOINFORMATICS

(9Hrs)

Overview of AI in bioinformatics - Applications of AI in bioinformatics - Machine learning and deep learning techniques - Data mining in bioinformatics - Challenges and future trends

#### **UNIT II - SEQUENCE ALIGNMENT AND ANALYSIS**

(9Hrs)

Sequence alignment fundamentals - Pairwise alignment - Multiple sequence alignment - Sequence databases - Pattern recognition and motif discovery

#### **UNIT III – GENE PREDICTION AND FUNCTIONAL ANNOTATION**

(9Hrs)

Gene prediction methods - Gene ontology - Functional annotation tools - Pathway analysis - Network biology and systems biology

#### **UNIT IV - PROTEIN STRUCTURE PREDICTION AND ANALYSIS**

(9Hrs)

HTTP Client/ Server. GORM - What is GORM - using GORM - doing CRUD operations. Rest architecture - Gorm patterns. SQL-JWT-Integrating with JWT.

#### UNIT V - APPLICATIONS OF AI IN GENOMICS AND DRUG DISCOVERY

(9Hrs)

Genome-wide association studies - Personalized medicine - Drug target identification - Drug design and optimization - Al-driven drug discovery pipelines

#### **TEXT BOOKS**

- 1. Edward Keedwell, Ajit Narayanan, "Intelligent Bio Informatics", 2005
- 2. Mario Cannataro, Pietro Hiram "Artificial Intelligence in Bio Informatics",2022
- 3. Jagath C, Bertil Schmidt "Pattern Recognition in Bio Informatics", 2007

# REFERENCE BOOKS

- U. Rajendra Acharya, Subhagata Chattopadhyay, and Sumeet Dua, "Artificial Intelligence and Machine Learning for Bioinformatics", 2018
- 2. Des Higgins and Willie Taylor, "Bioinformatics: Sequence, Structure and Databanks", 2000
- 3. Arthur M. Lesk ,"Introduction to Bioinformatics",2002
- Andreas D. Baxevanis and B. F. Francis Ouellette, "Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins", 1998
- 5. Jonathan Pevsner, "Bioinformatics and Functional Genomics", 2003

#### **WEB REFERENCES:**

- 1. National Center for Biotechnology Information (NCBI) (https://www.ncbi.nlm.nih.gov/)
- 2. European Bioinformatics Institute (EMBL-EBI) (https://www.ebi.ac.uk/)
- 3. Bioinformatics.org (https://www.bioinformatics.org/)
- Al in Bioinformatics by Towards Data Science (https://towardsdatascience.com/tagged/bioinformatics)
- 5. Al in Bioinformatics by Medium (https://medium.com/tag/bioinformatics)

COs	Program Specific													Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
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#### ALIN ECOMMERCE

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#### U20ADE822

**Course Objectives** 

The course will introduce the students to

- Understand the various concepts and applications of AI in Ecommerce
- Learn techniques for target audience analysis and market segmentation using Al-driven approaches
- Understand the machine learning and natural language processing in Ecommerce
- Understand the deep learning concepts in Ecommerce
- Understand the product recommendations and examine Al-enhanced customer service

#### **Course Outcomes**

After completion of the course, the students will be able to

- CO1 Understand the knowledge of the history and applications of AI in Ecommerce
- CO2 Understand the Al-driven Ecommerce strategies and their role in achieving business objectives.
- CO3 Apply the machine learning and natural language processing in Ecommerce
- CO4 Apply the Convolutional Neural Network (CNN) and Recurrent Neural Network (RNN) in Ecommerce
- CO5 Understand the business impact and performance.

#### UNIT I - INTRODUCTION TO AI IN ECOMMERCE

(9 Hrs)

Al in Ecommerce Overview - History of Al in Ecommerce - Al Applications in Ecommerce - Personalization and Recommendation Systems - Chatbots and Customer Service

#### **UNIT II – ARTIFICIAL INTELLIGENCE IN ECOMMERCE STRATEGY**

(9 Hrs)

Al-Driven Ecommerce Strategy - Target Audience Analysis - Market Segmentation - Al-Enhanced Marketing Campaigns - Retention and Loyalty Programs

#### **UNIT III - MACHINE LEARNING IN ECOMMERCE**

(9 Hrs)

Machine Learning Applications in Ecommerce - Supervised Learning for Customer Segmentation - Unsupervised Learning for Product Recommendations - Natural Language Processing for Sentiment Analysis

#### **UNIT IV - DEEP LEARNING IN ECOMMERCE**

(9 Hrs)

Deep Learning Applications in Ecommerce - Convolutional Neural Networks for Product Image Analysis - Recurrent Neural Networks for Customer Behaviour Prediction

#### UNIT V: CASE STUDIES IN AI-POWERED ECOMMERCE

(9 Hrs)

Personalized Product Recommendations - Al-Enhanced Customer Service - Predictive Inventory Management - Voice-Activated Shopping

#### **Text Books**

- 1. Honghao Gao, Jung Yoon Kim "Intelligent Processing Practices and Tools for E- Commerce",2021
- 2. Pooja Tiwari, Shalini Agarwal "Applications of Artificial Intelligence in Business and Finance",2021
- 3. Javier Segovia, Piotr S. Szczepaniak "Ecommerce and Intelligent Methods",2013.

#### Reference Books

- 1. Amit Fulay, "Artificial Intelligence for E-commerce: Applications, Opportunities and Challenges", 2022
- 2. Chris J. Albon, "Machine Learning for E-commerce: Practical Applications and Strategies", 2018
- 3. Nicholas Locascio, Nikhil Buduma, "Deep Learning for E-commerce: Building Intelligent Systems", 2016
- 4. Mike Murphy, "Al in Ecommerce: Strategies for Success in the Digital Economy", 2020
- Liangjie Hong ,Longqi Yang, "E-commerce Personalization: A Practical Guide to Al-Driven Customer Experience", ,2021

#### WEB REFERENCES:

- 1. Shopify's AI in Ecommerce Blog (https://www.shopify.com/blog/topics/ai-in-ecommerce)
- 2. Practical Ecommerce (https://www.practicalecommerce.com/category/ai)
- 3. Al in Ecommerce by Towards Data Science (https://towardsdatascience.com/tagged/ai-in-ecommerce)
- 4. Al in Ecommerce by Medium (https://medium.com/tag/ai-in-ecommerce)
- Al in Ecommerce by Forbes (https://www.forbes.com/sites/forbesbusinesscouncil/2020/08/11/how-ai-is-transforming-e-commerce/)

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#### **Course Objectives**

The course will introduce the students to

- To learn about the importance of information security
- To learn different scanning and enumeration methodologies and tools
- To understand various hacking techniques and attacks
- To be exposed to programming languages for security professionals
- To get familiarized with the different phases in penetration testing

#### **Course Outcomes**

After completion of the course, the students will be able to

- CO1 Understand the security concepts
- CO2 Understand the ethical hacking methodology
- CO3 Understand the scanning and vulnerability assessment
- CO4 Understand the system hacking and penetration testing
- CO5 Understand the security tools

#### UNIT I - INTRODUCTION TO ETHICAL HACKING

(9 Hrs)

Overview of Ethical Hacking - History and Evolution of Ethical Hacking - Ethical Hacking Terminology - Types of Hackers - Ethical Hacking Method - Legal and Ethical Considerations

#### UNIT II - FOOTPRINTING AND RECONNAISSANCE

(9 Hrs)

Footprinting Concepts - Information Gathering Techniques - DNS Enumeration - WHOIS Lookup - Network Scanning - Social Engineering - Reconnaissance Tools and Resources

#### **UNIT III – SCANNING AND VULNERABILITY ASSESSMENT**

(9 Hrs)

Network Scanning Techniques - Port Scanning - Vulnerability Scanning - Common Vulnerabilities and Exploits - Patch Management and Remediation

#### **UNIT IV - SYSTEM HACKING AND PENETRATION TESTING**

(9 Hrs)

Penetration Testing Methodologies - Gaining Access to Target Systems - Password Cracking Techniques - Privilege Escalation - Web Application and Wireless Network Penetration Testing

#### **UNIT V: SECURITY AND COUNTERMEASURES**

(9 Hrs)

Intrusion Detection and Prevention Systems - Firewalls and Network Security - Encryption and Cryptography - Secure Coding Practices - Security Policies and Best Practices

#### **Text Books**

- 1. Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy",2013
- 2. Sean-Philip Oriyano, "CEH v10: Certified Ethical Hacker Version 10 Study Guide"2018

David Kennedy, Jim O'Gorman, Devon Kearns, Mati Aharoni, "Metasploit: The Penetration Tester's Guide", 2011 Reference Books

- 1. Jon Erickson, "Hacking: The Art of Exploitation", 2003
- Patrick Engebretson , Marcus Pinto, "The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws" 2020
- 3. Georgia Weidman, "Penetration Testing: A Hands-On Introduction to Hacking", 2014
- 4. Justin Seitz ,"Black Hat Python: Python Programming for Hackers and Pentesters", 2014

#### **WEB REFERENCES**

- 1. Offensive Security (https://www.offensive-security.com/)\
- 2. The Hacker News (https://thehackernews.com/)
- 3. Cybrary (https://www.cybrary.it/)
- 4. Hack This Site (https://www.hackthissite.org/)
- 5. Ethical Hacking Tutorials by Guru99 (https://www.guru99.com/ethical-hacking-tutorials.html)

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#### AI IN AGRICULTURE

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#### Course Objectives

The course will introduce the students to

- · To understand how AI is used in agriculture
- To apply machine learning algorithms for classification
- To understand the smart sensor networks
- To understand quality assessment of agricultural produce using Al
- To build confidence among students to evaluate, choose and incorporate robots in agriculture

#### **Course Outcomes**

After completion of the course, the students will be able to

CO1 - Understand the challenges of AI in agriculture

CO2 - Understand crop disease detection

CO3 - Understand the concept of smart irrigation system

CO4 – Understand the crop yield prediction

CO5 - To study about the various robotics applications in agriculture

#### UNIT I INTRODUCTION TO AI IN AGRICULTURE

(9 Hrs)

Overview of AI and its applications in agriculture - Importance of AI in solving agricultural challenges - Data collection and pre-processing for agricultural applications - Crop monitoring and yield prediction using AI

#### UNIT II CROP DISEASE DETECTION AND MANAGEMENT

(9 Hrs)

Techniques for crop disease detection using AI- Disease classification and identification in plants - Disease management strategies using AI - Precision agriculture and targeted treatments

#### UNIT III SMART IRRIGATION AND WATER MANAGEMENT

(9 Hrs)

Al-based irrigation scheduling and optimization - Water demand forecasting for crops - Water resource management using Al - Smart sensor networks for efficient irrigation

#### UNIT IV CROP QUALITY AND YIELD OPTIMIZATION

( 9 Hrs)

Quality assessment and grading of agricultural produce using Al- Yield prediction and optimization models- Harvest planning and crop yield monitoring - Supply chain optimization in agriculture using Al

#### UNIT V AGRICULTURAL ROBOTICS AND AUTOMATION

(9 Hrs)

Robotics applications in agriculture - Autonomous vehicles for field operations - Robotic harvesting and precision spraying - Al-driven farm management and decision support systems

#### Text Books

- 1. Vikrant Shete, Bhavesh Patel, "Artificial Intelligence in Agriculture: Opportunities and Challenges", 2020
- 2. Noureddine Benkeblia, Neftali L. Vazquez-Rowe, "Precision Agriculture Technology for Crop Farming", 2018
- 3. Ramu Nachiappan, Kaushik Roy, "Al in Agriculture: Techniques, Applications, and Future Challenges", 2022

#### Reference Books

- Mahendra Rai and Eric Lichtfouse, "Artificial Intelligence in Agriculture: Applications and Techniques for Crop Management", 2021
- 2. Amit Joshi "Artificial Intelligence Techniques for Agriculture and Natural Resources Management" ,2020
- 3. Kaushik Roy, "Al in Agriculture: Techniques, Applications, and Future Challenges", 2022
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# U20ADE825 Course Objectives

The course will introduce the students to

- To understand ML OPS frameworks
- To understand types of machine learning
- To understand data transformation and normalization
- To understand SDLC and methodologies.
- To understand monitoring of ML models.

#### **Course Outcomes**

After completion of the course, the students will be able to

CO1 - Understand ML OPS roles and responsibilities.

CO2 - Uunderstand machine learning models.

CO3 - Understand data collection, security and privacy.

CO4 - Understand Testing strategies for ML models

CO5 - Understand Real time monitoring of ML models.

#### UNIT I INTRODUCTION TO ML OPS

(9 Hrs)

What is ML Ops - ML Ops lifecycle - ML Ops challenges - ML Ops benefits - ML Ops frameworks - ML Ops tools - ML Ops best practices - ML Ops culture - ML Ops roles and responsibilities

#### **UNIT II MACHINE LEARNING**

(9 Hrs)

Introduction to machine learning - Machine learning basics - Supervised learning - Unsupervised learning - Reinforcement learning - Machine learning algorithms - Machine learning evaluation - Addressing bias in machine learning models

#### **UNIT III DATA ENGINEERING**

(9 Hrs)

Data collection techniques - Data cleaning and pre-processing - Data wrangling and feature engineering - Data transformation and normalization - Data storage and retrieval systems - Ensuring data security and privacy - Data governance and compliance - Ethical considerations in data engineering

#### **UNIT IV SOFTWARE ENGINEERING**

(9 Hrs)

Software development lifecycle - Agile methodologies for ML Ops projects - Continuous integration and continuous delivery (CI/CD) - Software architecture for scalable ML systems - Design principles for ML Ops applications - Testing strategies for ML models and pipelines - Software quality assurance - Software security

#### **UNIT V DEPLOYMENT AND MONITORING**

(9 Hrs)

Model deployment - Real-time monitoring of ML models - Model retraining and versioning - Model performance metrics - Model drift and concept shift - Model explain ability - Strategies for model deployment in production - Optimization of ML models for performance and efficiency

#### **Text Books**

- 1. Emmanuel Ameisen, "Building Machine Learning Powered Applications: Going from Idea to Product",2020
- Mark Treveil, Jerry Overton, Chaminda Chandrasekara, "ML Ops: Operationalizing Machine Learning", 2021
- Noah Gift, Alfredo Deza, Kennedy Behrman, "Practical MLOps: Real-World Techniques for Deploying Machine Learning Models", 2022

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- 2. Andriy Burkov ,"Machine Learning Engineering", 2020
- 3. Foster Provost and Tom Fawcett, "Data Science for Business", 2013
- 4. Martin Kleppmann, "Designing Data-Intensive Applications", 2017
- Jez Humble and David Farley, "Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation", 2010

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- 2. Google's Machine Learning Crash Course (https://developers.google.com/machine-learning/crash-course)
- 3. Towards Data Science (https://towardsdatascience.com/)
- 4. The DevOps Handbook (https://www.devopshandbook.com/)
- 5. MLflow (https://mlflow.org/)

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#### AI IN AUTOMOBILE INDUSTRY

L T P C Hrs

#### U20ADE826

# Course Objectives

The course will introduce the students to

- To understand the Challenges of Al
- To understand the Technologies for AI in automobile industry.
- To understand the Collision avoidance system
- To understand CAD
- To impart concern for future opportunity and challenges

#### **Course Outcomes**

After completion of the course, the students will be able to

CO1 - Understand the challenges of Al

CO2 - Understand the real time data processing system

CO3 – Understand the AI based collision avoidance system.

CO4 - Understand quality control using AI

CO5 - Effects of Security in Al vechicles.

#### UNIT I INTRODUCTION TO AI IN THE AUTOMOBILE INDUSTRY

(9 Hrs)

Overview of AI in the automotive industry - AI in autonomous vehicles - AI-powered driver assistance systems (ADAS) - Impact of AI on car manufacturing - Challenges of AI in Automobile Industry

#### **UNIT II AI APPLICATIONS IN CONNECTED CARS**

(9 Hrs)

Introduction to connected cars and IoT - Al-driven vehicle connectivity - Intelligent navigation systems - Real time data processing in connected cars - Electric vehicles - Technologies for Al in Automobile Industry: Machine learning - Deep learning - Natural language processing - Computer vision - Robotics

# UNIT III AI IN VEHICLE SAFETY AND DRIVER ASSISTANCE

(9 Hrs)

Al-based collision avoidance systems - Adaptive cruise control and lane-keeping - Pedestrian and cyclist detection - Driver behaviour analysis - Emergency braking using Al

#### UNIT IV AI IN AUTOMOTIVE DESIGN AND MANUFACTURING

(9 Hrs)

Al in virtual prototyping and simulation - Computer-aided design (CAD) with AI - Quality control using AI vision systems - Robotics and automation in manufacturing - Supply chain optimization with AI.

#### UNIT V FUTURE TRENDS AND CHALLENGES IN AI AND AUTOMOTIVE INDUSTRY

(9 Hrs)

Autonomous driving and automation levels - Al in electric and alternative fuel vehicles - Integration with smart cities and infrastructure - Data governance and security in Al vehicles - Future challenges and opportunities.

#### Text Books

- Shashank Dubey, Neetesh Kumar, "Al in Automotive: A Practical Handbook for Designing and Deploying Al Solutions in the Automotive Industry" 2021
- Christian Müller, Marc Störing, "Artificial Intelligence in the Automotive Industry: Transforming Mobility with AI" 2020
- 3. Markus Maurer, J. Christian Gerdes, "Autonomous Driving: Technical, Legal and Social Aspects" 2019 Reference Books
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  - Alexey Global, J. Neil Otte, "Artificial Intelligence in the Automotive Industry: Embracing the Future of Mobility", 2021
  - 3. Yaobin Chen, "Intelligent Vehicles: Fundamentals, Technologies, and Applications" ,2016
  - 4. Markus Maurer, J. Christian Gerdes, Barbara Lenz, and Hermann Winner, "Al in Automotive Engineering: From Driver Assistance to Autonomous Driving", 2019
  - David Hoyle , "Automotive Quality Systems Handbook", 2000"Automotive Quality Systems Handbook" by David Hoyle

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- 4. Autonomous Vehicle Engineering https://www.sae.org/publications/magazines/autonomous-vehicle-engineering
- 5. Al in Automotive https://www.aiia.net/automotive

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# AI IN CUSTOMER SERVICE

L T P C Hrs 3 0 0 3 45

#### **Course Objectives**

- · To learn about the challenges of NLP
- To understand the concept of chatbot integration
- To learn about the customer relationship management
- To understand and implementation of speech recognition technologies
- To understand the concept of Object detection and recognition.

#### **Course Outcomes**

After completion of the course, the students will be able to

- CO1 Learn about challenges of AI in customer service
- CO2 Concept of Image and Video enhancement and restoration.
- CO3 Various concepts of CRM.
- CO4 Various concept Feature Detection And Description.
- CO5 Concept of Object detection and recognition.

#### UNIT 1 INTRODUCTION TO AI IN CUSTOMER SERVICE

(9 Hrs)

Overview of AI in customer service - Role of AI in enhancing customer experiences - AI-powered chatbots and virtual assistants - Natural language processing for customer interactions - Benefits and challenges of AI in customer service

#### **UNIT 2 AI APPLICATIONS IN CUSTOMER SUPPORT**

(9 Hrs)

Automated ticketing and routing using AI - Customer self-service and knowledge bases with AI - Chatbot integration for improved customer interactions - AI-driven sentiment analysis for customer feedback - Personalization and recommendation systems using AI

# UNIT 3 AI FOR CUSTOMER RELATIONSHIP MANAGEMENT (CRM)

(9 Hrs)

Al-driven lead generation and customer acquisition - Al-powered customer segmentation and profiling - Predictive analytics for customer behaviour and preferences - Al in personalized marketing and targeted campaigns - Customer churn prediction and retention strategies using Al

# UNIT 4: AI IN VOICE AND SPEECH TECHNOLOGIES FOR CUSTOMER SERVICE

(9 Hrs)

Al-enabled speech recognition and transcription - Voice biometrics and speaker identification using Al - Natural language understanding and intent recognition - Voice analytics for customer sentiment analysis - Al-powered voice assistants for customer support

# UNIT OBJECT DETECTION AND RECOGNITION.

(9 Hrs)

Emerging AI technologies in customer service - AI ethics and transparency in customer service - AI and automation. Redefining the future of customer service workforce - Impact of AI on customer service operations and cost reduction - The role of AI in hyper-personalization of customer experiences

#### **Text Books**

- 1. Pasquale Stirparo, "Al in Customer Service: A Practical Guide for Customer Experience Professionals", 2021
- Steven Van Belleghem, "Artificial Intelligence in Customer Experience Management: A Comprehensive Guide for Practitioners", 2020
- Pam Didner "The Al-Powered Customer: How Artificial Intelligence is Revolutionizing the Way Companies Interact with Customers", 2019

#### Reference Books

- 1. Mathew Dixon, "The Effortless Experience: Conquering the New Battleground for Customer Loyalty", 2013
- 2. Abhijit Bhaduri, "Al-Powered Customer Service: A Practical Guide", 2018
- 3. Peter J. Rosenwald, "Al in Marketing, Sales and Service", 2021
- Lior Arussy ,"Al in Customer Experience: Transforming Customer Engagement with Artificial Intelligence", 2016
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- 3. https://www.salesforce.com/products/einstein/overview
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#### AI IN SMART CITIES

L T P C Hrs 3 0 0 3 45

#### **Course Objectives**

- · To learn about Role of Al in Smart Cities
- To learn various applications of urban mobility
- To learn Al for energy efficiency and sustainability
- Understand the IoT frameworks
- To understand various concept and implementation of Social Media Analysis.

#### **Course Outcomes**

After completion of the course, the students will be able to

- CO1 Understand the basics of IoT in smart cities
- CO2 Understand the smart technologies using AI
- CO3 understand AI based energy forecasting
- CO4 Analyse the safety concern about public
- CO5 Understand the chatbots and virtual assistants

# **UNIT 1 INTRODUCTION TO AI IN SMART CITIES**

(9 Hrs)

Overview of Al in smart cities - Role of Al in transforming urban infrastructure - Benefits and challenges of implementing Al in smart cities - Al-powered sensors and Internet of Things (IoT) - Data analytics and predictive modelling

#### **UNIT 2 AI APPLICATIONS IN URBAN MOBILITY**

(9 Hrs)

Al-driven traffic management - congestion prediction - Intelligent transportation systems - smart traffic lights - Alpowered public transportation optimization - Autonomous vehicles and self-driving technology - Smart parking solutions using Al

# **UNIT 3 AI FOR ENERGY EFFICIENCY AND SUSTAINABILITY**

(9 Hrs).

Al-based energy demand forecasting and optimization - Smart grid management - Al-enabled energy distribution - Energy consumption analytics and smart metering - Al in renewable energy integration and optimization - Sustainable waste management and recycling with Al

#### **UNIT 4 AI FOR PUBLIC SAFETY AND SECURITY**

(9 Hrs)

Al-powered video surveillance and facial recognition - Predictive policing and crime pattern analysis - Emergency response systems using Al and IoT - Al in disaster management - early warning systems - Cybersecurity and Alenabled threat detection in smart cities

# UNIT 5 AI FOR CITIŽEN ENGAGEMENT AND SERVICES

(9 Hrs

Al-powered smart city platforms and citizen portals - Al-enabled personalized citizen services and recommendations - Chatbots and virtual assistants for citizen support - Social media analytics and sentiment analysis - Al in smart governance

#### **Text Books**

- 1. Gaurav Kumar, Pradeep Tomar, Siddhartha Bhattacharyya, "Artificial Intelligence for Smart Cities: Technologies and Applications" 2020
- 2. H. V. Jagadish, Shyam R. Chidamber, "Smart Cities: Foundations, Principles, and Applications" 2017
- 3. Saifullah Muhammad, Chaker Abdelaziz Kerrachel, "The Future of Smart Cities: Applying Artificial Intelligence and Blockchain Technologies" 2020

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- 1. Amir H. Gandomi and Amir Alavi , "Artificial Intelligence for Smart Cities", 2020
- 2. Ravi S.Sandhu, "Artificial Intelligence in Smart Cities: Technologies, Applications, and Challenges", 2021
- 3. Anthony M. Townsend, "Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia", 2013
- Houbing Song, Danda B. Rawat, and Sabina Jeschke, "Al for Sustainable Cities: Integrating Al, IoT, and Smart Cities", 2020
- 5. Yassine Maleh and Mohamed Anouar Essayouti, "Al and IoT in Smart City Security", 2019

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- 5. https://smartcitylab.com/

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#### **HEALTHCARE DATA ANALYTICS**

L T P C Hrs 3 0 0 3 45

#### **Course Objectives**

- Understand the health data formats, health care policy and standards.
- Learn the significance and need of data analysis and data visualization
- · Understand the health data management frameworks
- Learn the use of machine learning and deep learning algorithms in healthcare
- Apply healthcare analytics for critical care applications

#### **Course Outcomes**

After completion of the course, the students will be able to

- CO1 To gain knowledge about the healthcare data analytics
- CO2 Understand the concept of correlation and Regressions
- CO3 Understand the various concepts of Machine learning techniques
- CO4 Understand the real world applications of data analytics
- CO5 Learn about the privacy issues in healthcare

#### **UNIT 1 INTRODUCTION TO HEALTHCARE DATA ANALYTICS**

(9Hrs)

Introduction to healthcare data analytics and its significance - NLP pre-processing steps for healthcare data - NLP feature engineering for healthcare data - WordNet and WordNet-based similarity measures - Concept mining in healthcare data analytics

#### **UNIT 2 STATISTICAL ANALYSIS IN HEALTHCARE**

(9Hrs)

Descriptive statistics for healthcare data - Hypothesis testing and significance analysis - Correlation and regression analysis in healthcare

#### **UNIT 3 MACHINE LEARNING FOR HEALTHCARE DATA ANALYTICS**

(9Hrs)

Supervised learning algorithms for healthcare prediction - Unsupervised learning techniques in healthcare - Evaluation and validation of machine learning models in healthcare

#### **UNIT 4 APPLICATIONS OF HEALTHCARE DATA ANALYTICS**

(9Hrs)

Predictive modelling for disease diagnosis and prognosis - Healthcare resource allocation and optimization - Fraud detection and anomaly detection in healthcare data

#### UNIT 5 ETHICAL AND PRIVACY CONSIDERATIONS IN HEALTHCARE DATA ANALYTICS

(9Hrs)

Privacy issues and data security in healthcare analytics - Ethical considerations and responsible use of healthcare data

# . Text Books

- Wiley V. Midgley, Philip H. Birch, "Healthcare Analytics: From Data to Knowledge to Healthcare Improvement", 2014
- 2. Nilmini Wickramasinghe, "Healthcare Data Analytics and Management", 2019
- 3. Trevor L.Strome, "Healthcare Data Analytics for Quality and Performance Improvement", 2013

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- Umit Bititci, Nezih Altay, and Andy Neely, "Data Science for Healthcare: Methodologies and Applications", 2015
- 3. Hui Yang, "Healthcare Analytics: From Data to Knowledge to Healthcare Improvement", 2016
- 4. Chandan K. Reddy and Charu C. Aggarwal, "Healthcare Data Analytics", 2020
- 5. Sachin Garg and Rajkumar Buyya, "Big Data Analytics in Healthcare: Promise and Potential", 2018

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AI IN FINANCE

L T P C

Hrs

#### **Course Objectives**

To learn about Finance in Al

- To understand the concept of financial risk management
- · To learn various techniques of supervised and unsupervised learning in finance
- To learn about the data security in financial services
- To understand various applications of AI in finance

#### **Course Outcomes**

After completion of the course, the students will be able to

CO1 - Understand applications in finance

CO2 - Understand various quantitative techniques in finance

CO3 - Understand the techniques for financial data analysis

CO4 - To study the real world applications of AI in Finance Services

CO5 - To study the compliance aspects of AI in Finance

# **UNIT 1 INTRODUCTION TO AI IN FINANCE**

(9 Hrs)

Overview of Al and its applications in finance - Basics of financial markets and instruments - Data sources and preprocessing for financial data - Time series analysis and feature engineering

#### **UNIT 2 QUANTITATIVE TECHNIQUES IN FINANCE**

(9 Hrs)

Financial data analysis and visualization - Hypothesis testing and statistical inference in finance - financial risk measurement and management - Portfolio theory and optimization

#### **UNIT 3 AI TECHNIQUES FOR FINANCIAL DATA ANALYSIS**

(9 Hrs)

Supervised learning for financial forecasting - Unsupervised learning in financial applications - Model evaluation and validation in finance - Dimensionality reduction and feature selection

# **UNIT 4 USE CASES OF AI IN FINANCE SERVICES**

(9 Hrs)

Al-driven trading and investment strategies - Credit risk assessment and loan approval - financial fraud detection and prevention - Al-powered financial advisory services

# UNIT 5 ETHICAL AND COMPLIANCE ASPECTS OF AI IN FINANCE

(9 Hrs)

Data privacy and security in financial Al applications - Ethical considerations in Al-driven financial decision -making - Regulatory requirements and Al compliance - Explainable Al and financial model transparency

#### **Text Books**

- 1. Christian L. Dunis, Peter W. Middleton, "Artificial Intelligence in Financial Markets", 2021
- 2. Marcos M. López de Prado, "Machine Learning for Asset Managers", 2020
- 3. Yves Hilpisch, "Artificial Intelligence in Finance", 2020

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- 1. Marcos Lopez de Prado, "Advances in Financial Machine Learning", 2018
- 2. Stefan Jaimungal ,"Machine Learning for Financial Engineering", 2012
- 3. Christian L. Dunis, "Artificial Intelligence in Financial Markets", 2021
- Mark Bennett and Dirk L. Hugen, "Financial Analytics with R: Building a Laptop Laboratory for Data Science", 2016
- Financial Stability Board, "Al and Machine Learning in Financial Services: Market Developments and Financial Stability Implications", 2019

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Annexure – II B.Tech and M.Tech Curriculum R-2023

# **B.TECH CURRICULUM**

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3	U23CSTC01	Programming In C	ES	3	0	0	3	25	75	100
4	U23ADT101	Digital System Design	ES	3	0	0	3	25	75	100
5	U23ADT102	Fundamental of Data Science	PC	3	0	0	3	25	75	100
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8	U23ESPC03	Engineering Graphics using AutoCAD	ES	0	0	2	1	50	50	100
9	U20ADP101	Fundamental of Data Science Laboratory	PC	0	0	2	1	50	50	100
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2	U23BSTC01	Physical Science for Engineers	ES	2	2	0	3	25	75	100
3	U23ADTC01	Programming in Python	ES	3	0	0	3	25	75	100
4	U23CSTC03	Data Structures	ES	3	0	0	°3	25	75	100
5	U23ADT203	Database Technologies	PC	3	0	0	3	25	75	100
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7	U23ESPC02	Design Thinking and Idea Lab	ES	0	0	2	1	50	50	100
8	U23ADPC01	Programming in Python Laboratory	ES	0	0	2	1	50	50	100
9	U23CSPC02	Data Structures Laboratory	ES	0	0	2	1	50	50	100
10	U23ADP202	Database Technologies Laboratory	PC	0	0	2	1	50	50	100
Abilit	y Enhancement C	Courses		1 5						
11	U23ADC2XX	Certification Course-II	AEC	0	0	4	0	100		100
Mand	atory Course					V.		1 - 12	E 12 115	many sign
12	U23ADM202	Sports Yoga and NSS	MC	0	0	2	0	100	-	100
				A		•	23	575	625	1200

<sup>\*</sup> Certification Courses are to be selected from the list given in Annexure III

SI.	Course Code	Course Title	Category	Pe	erio	ds	Credits		Max. Ma	arks
No.	oodisc oode	Course Title	Category	L	Т	Р	Credits	CAM	ESM	Total
Theo	ry	Parlat - Tan			11	- 1			19	
1	U23MATC03	Probability and Statistics for Data Science	BS	2	2	0	4	25	75	100
2	U23ADT304	Software Engineering and Agile software Development	ES	3	0	0	3	25	75	100
3	U23ADT305	Artificial Intelligence & Expert System	PC	3	0	0	3	25	75	100
4	U23ADT306	Basic Machine Learning Techniques	PC	3	0	0	3	25	75	100
5	U23HSTC01	Universal Human Values-II	HS	3	0	0	2	25	75	100
Theo	ry cum Practical	7 4	4				1		to Happer	res - :
6	U23ADB301	Design and Analysis of Algorithm	ES	2	0	2	3	50	50	100
Pract	tical	-t-t-t-al year year								
7	U23ENPC02	General Proficiency – I	HS	0	0	2	1	50	50	100
8	U23MAPC01	Statistical Laboratory	BS	0	0	2	1	50	50	100
9	U23ADP303	Artificial Intelligence& Expert System Laboratory	PC	0	0	2	1	50	50	100
10	U23ADP304	Basic Machine Learning Techniques Laboratory	PC	0	0	2	1	50	50	100
Abilit	y Enhancement									3 1 2
11	U23ADC3XX	Certification Course-III	AEC	0	0	4	-	100	- 1	100
12	U23ADS301	Skill Enhancement Course-I*	AEC	0	0	2		100	-	100
	latory Course					- 1				
13	U23ADM303	Climate Change	MC	0	0	2	103	100		100
							22	675	625	1300

SI. No	Course Code	Course Title	Category	Periods			0174	Max. Marks		
				L	T	Р	Credits	CAM	ESM	Total
The	ory								- HOME	Ť T
1	U23MATC05	Discrete Mathematics	BS	2	2	0	4	25	75	100
2	U23ADDC01	Computer Networks and Cyber Security	ES	3	0	0	3	25	75	100
3	U23ITTCO3	Programming in Java	ES	3	0	0	3	25	75	100
4	U23ADT408	Advanced Machine Learning Techniques	PC	3	0	0	3	25	75	100
5	U23ADE4XX	Professional Elective - I#	PE	3	0	0	3	25	75	100
The	ory cum Practica	l de la companya de	In Pro-		TO SUR		erri I. s.	9-73: 50		
6	U23ADB402	Linux Internals	ES	2	0	2	3	50	50	100
Prac	tical		today a					277242		
7	U23ENPC02	General Proficiency – II	HS	0	0	2	- 1	50	50	100
8	U23ADP405	Computer Networks and Cyber Security Laboratory	ES	0	0	2	1 1	50	50	100
9	U23ITPCO3	Programming in Java Laboratory	ES	0	0	2	1	50	50	100
10	U23ADP406	Advanced Machine Learning Techniques Laboratory	PC	0	0	2		50	50	100
Abili	ty Enhancement	Courses				1	a life to "Tab	-12 A T S 12 A	vitt ledicies	1911
11	U23ADC4XX	Certification Course-IV	AEC	0	0	4	220 - 100	100	21 - V	100
12	U23ADS402	Skill Enhancement Course-II*	AEC	0	0	2		100		100
Man	datory Course						1-70			
13	U23ADM404	Right to Information and Good Governance	МС	0	0	2	BUI TRE	100		100
						y'v	23	675	625	1300

<sup>#</sup> Professional Elective Courses are to be selected from the list given in Annexure I
\*Skill Enhancement Courses (1 and 2) are to be selected from the list given in Annexure IV

		SEME	STER - V							
SI. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	Р		CAM	ESM	Total
Theory		er in will and Stock and the comprehensive the indicate	و كالبارج ل دو	NAP.	1413	MINT.	fe wall		Sand i	
. 1	U23HSTC02	Research Methodology	HS	2	0	0	2	25	7.5	100
2	U23ADT509	Cloud Computing and Architectures for Management of Large Datasets	PC	3	0	0	3	25	75	100
3	U23ADT510	Deep Learning	PC	3	0	0	3	25	75	100
4	U23ADT511	Data Visualization	PC	3	0	0	3	25	75	100
5	U23ADE5XX	Professional Elective – II	PE	3	0	0	3	25	75	100
6	U23ADO5XX	Open Elective – I	OE	3	0	0	3	25	75	100
Practic	al									
7	U23ADP507	Cloud Computing Architectures for Management of Large Datasets Laboratory	PC	0	0	2	1	50	50	100
8	U23ADP508	Deep Learning Laboratory	PC	0	0	2	1	50	50	100
9	U23ADP509	Data Visualization Laboratory	PC	0	0	2	1	50	50	100
Project	t Work			ligge t ja	100	3 III.	1 10 40	Wile !		1 -
10	U23ADW501	Micro project	PA	0	0	2	1	100	91 <u>.</u>	100
Ability	Enhancement Co	ourses				11-0	all a Sell		ting to	
11	U23ADC5XX	Certification Course-V	AEC	0	0	4	1211	100	-	100
Manda	tory Course									
12	U23ADM505	Essence of Indian Traditional Knowledge	МС	0	0	2		100		100
						- 1	21	600	600	1200

		SEMES	TER - VI							
SI. No	Course Code	Course Title	Category	Periods			0	Max. Marks		
				L	. 1	Р	Credits	CAM	ESM	Total
Theory	1							44444		
1	U23ADT612	NLP and Chatbot	PC	3	0	0	3	25	75	100
2	U23ADT613	Robotic Process Automation – UI Path	PC	3	0	0	3	25	75	100
3	U23ADT614	Web Technology	。PC	3	0	0	3	25	75	100
4	U23ADE6XX	Professional Elective - III	PE	3	0	0	3	25	75	100
5	U23ADO6XX	Open Elective - II	OE	3	0	0	3	25	75	100
Theory	cum Practical	a laterate as as	GT 6045	HT		, was	. 15 - 510 12	11 Y Y		
6	U23ADB603	Blockchain and Cryptography	PC	2	0	2	3	50	50	100
Praction	al	SELECTION CO. P. I		11.	1110	10		1 1 5		
7	U23ADP610	NLP and Chatbot Laboratory	PC	(		2	1	50	50	100
8	U23ADP611	Robotic Process Automation – UI Path Laboratory	PC	(	) (	2	1.	50	50	100
9	U23ADP612	Web Technology Laboratory	PC	(	0	2	1	50	50	100
Projec	t Work			110					3.	
10	U23ADW602	Mini project	PA.	(	0	2	1	100	1 .	100
Ability	Enhancement Co	ourse		. 8	27	THE	AND A STORY	Y WITE	v.J.	1 14
11	U23ADC6XX	Certification Course - VI	AEC	(	) (	4	- PK-PLI-876-	100	\$	100
Manda	tory Course	The state of the s		100 (21)	72.		100 A 100			11/2
12	U23ADM606	Gender Equality	MC	(	) (	2		100		100
e in the second of the second						45.7	22	625	575	1200

<sup>\$</sup> Choose any one Professional Elective Course from the list given in Annexure II

		SEN	MESTER - VI	l						
SI.	Course Code	Course Title	Category	F	Perio	ds	Credits	N	lax. Mar	ks
No	Course code	Course Title	Category	L	T	Р	Credits	CAM	ESM	100 100 100 100 100 100 100 100 100
The	ory	The Land Administration						in mixama	THE HELD	Jan Jan
1	U23ADT715	Intelligent Systems and Control	PC	:3	0	0	3	25	75	100
2	U23ADT716	IoT Systems and Analytics	PC	3	0	0	3	25	75	100
3	U23ADT717	Image Processing and Computer Vision	PC	3	0	0	3	25	75	100
4	U23ADE7XX	Professional Elective – IV	PE	3	0	0	3	25	75	100
5	U23ADO7XX	Open Elective – III	OE	3	0	0	3	25	75	100
Prac	tical		er, politic		3.		1 1		1	d
6	U23ADP713	Intelligent Systems and Control Laboratory	PC	0	0	2	1	50	50	100
7	U23ADP714	IoT Systems and Analytics Laboratory	PC	0	0	2	1	50	50	100
Proj	ect Work	y Tilostalo ; alsa 6 actra	194	M.	JUNE		-		1	. 4, 4 5
8	U23ADW703	Project Phase – I	PA	0	0	4	2	50	50	100
9	U23ADW704	Internship / In plant Training	PA	0	0	2	1	100	-	100
1		primare i sastronic					20	375	525	900

		SEN	MESTER - VI	11						
SI.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
No.	M.	L T P		Р	Credits	CAM	ESM	Total		
Theo	ry						2			
1	U23HSTC03	Entrepreneurship and Business Management	HS	3	0	0	3	25	75	100
2	U23ADE8XX	Professional Elective – V	PE	3	0	0	3	25	75	100
3	U23ADE8XX	Professional Elective - VI	PE	3	0	0	3	25	75	100
Proje	ct Work	a filty imaginable or development	· · · · · · · · · · · · · · · · · · ·	200	1 E	· -			9	
4	U23ADW805	Project Phase – II	PA	0	0	16	8	50	100	150
			7.01				17	125	325	450

## ANNEXURE - I PROFESSIONAL ELECTIVE COURSES (18 CREDITS)

SI. No.	Course Code	Course Title				
	Professional Elec	tive – I (Offered in Semester IV)				
1	U23CSTC01	Automata and Compiler Design				
2	U23ADE401	Al in Smart Cities				
3	U23ADE402	Ethics in Data Science				
4	U23ADE403	Genetic Algorithm				
5	U23ADE404	User Experience Design				
	Professional Elect	ive – II (Offered in Semester V) *				
1	U23ADE505	Speech Processing and Analytics				
2	U23ADE506	Reinforcement Learning				
3	U23CBEC01	Business Intelligence and Applications				
4	U23ADE507	Graph Analytics				
5	U23ADE508	Advanced Java Programming				
	Professional Electi	ve – III (Offered in Semester VI) *				
1	U23ADE609	Web Analytics				
2	U23ADE610	Al and Embedded Systems				
3	U23ADE611	Pattern Recognition Techniques				
4	U23ADE612	Time Series Analysis and Forecasting				
5	U23ADE613	Text Analysis				
ı	 Professional Electi	ve – IV (Offered in Semester VII) *				
1	U23ADE714	Artificial Intelligence in Biometric System				
2	U23CBEC02	Virtual Reality				
3	U23ADE715	Recommender System				
4	U23CSEC01	Go Programming				
5	U23ADE716	Predictive Analytics				
1	Professional Electi	ve – V (Offered in Semester VIII) *				
1	U23ADE817	Healthcare Data Analytics				
2	U23ADE818	Artificial Intelligence and Green Power Technology				
3	U23CBEC03	Augmented Reality				
4	U23ADE819	Al in E-Commerce				
5	U23ADE820	Ethical Hacking				

	Professional Elect	ive - VI (Offered in Semester VIII)	*	
iestilian	U23ADE821	Artificial Intelligence and Machin Agriculture	e Learning in	
2	U23ADE822	Al Ethics	1 20 1 10 1	
3	U23ADE823	Al in Finance		
4	U23ADE824	Al in Customer Service	TOXOLEN.	
5	U23ADE825	ML OPS	COXLAND	
			10.5787	

#### ANNEXURE - II

#### **OPEN ELECTIVE COURSES (09 CREDITS)**

S. No	Course Code	Course Title	Offering Department	Permitted Departments
(Offered	d in Semester V fo	n Elective-II (Offered in Semester V or CSE, IT, MECH, Mechatronics, A or EEE, ECE, ICE, CIVIL, BME, CCI	I&DS)	Temples of the
1 1 7.A	U23ADDC02	Principles of Artificial Intelligence and Machine Learning	AI&DS	EEE, ECE, CSE, IT, ICE, MECH, CIVIL, CCE, BME, Mechatronics
2	U23ADOCO2	Introduction to Data Science	AI&DS	EEE, ECE, CSE, IT, ICE, MECH, CIVIL, CCE, BME, Mechatronics
Open E	Elective – II (Offe	red in Semester VII)		
3	U23ADOC03	Data science Application of Vision	AI&DS	EEE, ECE, CSE, IT, ICE, MECH, CIVIL, CCE
4	U23ADOC04	Artificial Intelligence Applications	AI&DS	EEE, ECE, CSE, IT, ICE, MECH, CIVIL, CCE, BME, Mechatronics

# ANNEXURE - III ABILITY ENHANCEMENT COURSES-(A) CERTIFICATION COURSES

S. No	Course Code	Course Title	Certified By
1	U23XXCX01	Adobe Photoshop	Adobe
2	U23XXCX02	Adobe Animate	Adobe
3	U23XXCX03	Adobe Dreamweaver	Adobe
4	U23XXCX04	Adobe After Effects	Adobe
5	U23XXCX05	Adobe Illustrator	Adobe
6	U23XXCX06	Adobe InDesign	Adobe
7,	U23XXCX07	Autodesk AutoCAD -ACU	Autodesk
8	U23XXCX08	Autodesk Inventor - ACU	Autodesk
9	U23XXCX09	Autodesk Revit - ACU	Autodesk
10	U23XXCX10	Autodesk Fusion 360 - ACU	Autodesk
11	U23XXCX11	Autodesk 3ds Max - ACU	Autodesk
12	U23XXCX12	Autodesk Maya - ACU	Autodesk
13	U23XXCX13	Cloud Security Foundations	AWS
14	U23XXCX14	Cloud Computing Architecture	AWS
15	U23XXCX15	Cloud Foundation	AWS
16	U23XXCX16	Cloud Practitioner	AWS
17	U23XXCX17	Cloud Solution Architect	AWS
18	U23XXCX18	Data Engineering	AWS
19	U23XXCX19	Machine Learning Foundation	AWS
20	U23XXCX20	Robotic Process Automation / Medical Robotics	Blue Prism
21	U23XXCX21	Advance Programming Using C	CISCO
22	U23XXCX22	Advance Programming Using C ++	CISCO
23	U23XXCX23	C Programming	CISCO
24	U23XXCX24	C++ Programming	CISCO
25	U23XXCX25	CCNP Enterprise: Advanced Routing	CISCO
26	U23XXCX26	CCNP Enterprise: Core Networking	CISCO
27	U23XXCX27	Cisco Certified Network Associate - Level 2	CISCO
28	U23XXCX28	Cisco Certified Network Associate- Level 1	CISCO
29	U23XXCX29	Cisco Certified Network Associate- Level 3	CISCO
30	U23XXCX30	Fundamentals Of Internet of Things	CISCO

31	U23XXCX31	Internet Of Things / Solar and Smart Energy System with IoT	CISCO
32	U23XXCX32	Java Script Programming	CISCO
33	U23XXCX33	NGD Linux Essentials	CISCO
34	U23XXCX34	NGD Linux I	CISCO
35	U23XXCX35	NGD Linux II	CISCO
36	U23XXCX36	Advance Java Programming	Ethnotech
37	U23XXCX37	Android Programming / Android Medical App Development	Ethnotech
38	U23XXCX38	Angular JS	Ethnotech
39	U23XXCX39	Catia	Ethnotech
40	U23XXCX40	Communication Skills for Business	Ethnotech
41	U23XXCX41	Coral Draw	Ethnotech
42	U23XXCX42	Data Science Using R	Ethnotech
43	U23XXCX43	Digital Marketing	Ethnotech
44	U23XXCX44	Embedded System Using C	Ethnotech
45	U23XXCX45	Embedded System with IOT / Arduino	Ethnotech
46	U23XXCX46	English For IT	Ethnotech
47	U23XXCX47	Plaxis	Ethnotech
48	U23XXCX48	Sketch Up	Ethnotech
49	U23XXCX49	Financial Planning, Banking and Investment Management	Ethnotech
50	U23XXCX50	Foundation Of Stock Market Investing	Ethnotech
51	U23XXCX51	Machine Learning / Machine Learning for Medical Diagnosis	Ethnotech
52	U23XXCX52	IOT Using Python	Ethnotech
53	U23XXCX53	Creo (Modelling & Simulation)	Ethnotech
54	U23XXCX54	Soft Skills, Verbal, Aptitude	Ethnotech
55	U23XXCX55	Software Testing	Ethnotech
56	U23XXCX56	MX-Road	Ethnotech
57	U23XXCX57	CLO 3D	Ethnotech
58	U23XXCX58	Solid works	Ethnotech
59	U23XXCX59	Staad Pro	Ethnotech
60	U23XXCX60	Total Station	Ethnotech
61	U23XXCX61	Hydraulic Automation	Festo
62	U23XXCX62	Industrial Automation	Festo
63	U23XXCX63	Pneumatics Automation	Festo

64	U23XXCX64	Agile Methodologies	IBM
65	U23XXCX65	Block Chain	IBM
66	U23XXCX66	Devops	IBM
67	U23XXCX67	Artificial Intelligence	ITS
68	U23XXCX68	Cloud Computing	ITS
69	U23XXCX69	Computational Thinking	ITS
70	U23XXCX70	Cyber Security	ITS
71	U23XXCX71	Data Analytics	ITS
72	U23XXCX72	Databases	ITS
73	U23XXCX73	Java Programming	ITS
74	U23XXCX74	Networking	ITS
75	U23XXCX75	Python Programming	ITS
76	U23XXCX76	Web Application Development (HTML, CSS, JS)	ITS
77	U23XXCX77	Network Security	ITS & Palo alt
78	U23XXCX78	MATLAB	MathWorks
79	U23XXCX79	Azure Fundamentals	Microsoft
80	U23XXCX80	Azure AI (AI-900)	Microsoft
81	U23XXCX81	Azure Data (DP -900)	Microsoft
82	U23XXCX82	Microsoft 365 Fundamentals (SS-900)	Microsoft
83	U23XXCX83	Microsoft Security, Compliance and Identity (SC-900)	Microsoft
84	U23XXCX84	Microsoft Power Platform (PI-900)	Microsoft
85	U23XXCX85	Microsoft Dynamics Fundamentals 365 – CRM	Microsoft
86	U23XXCX86	Microsoft Excel	Microsoft
87	U23XXCX87	Microsoft Excel Expert	Microsoft
88	U23XXCX88	Securities Market Foundation	NISM
89	U23XXCX89	Derivatives Equinity	NISM
90	U23XXCX90	Research Analyst	NISM
91	U23XXCX91	Portfolio Management Services	NISM
92	U23XXCX92	Cyber Security	Palo alto
93	U23XXCX93	Cloud Security	Palo alto
94	U23XXCX94	PMI – Ready	PMI
95	U23XXCX95	Tally – GST & TDS	Tally
96	U23XXCX96	Advance Tally	Tally

97	U23XXCX97	Associate Artist	Unity
98	U23XXCX98	Certified Unity Programming	Unity
99	U23XXCX99	VR Development	Unity

#### ANNEXURE - IV

#### ABILITY ENHANCEMENT COURSES-(B) SKILL ENHANCEMENT COURSES

		THE STATE OF
SI. No.	Course Code	Course Title
	U23ADS301	SKILL ENHANCEMENT COURSE 1
1		a) Clean code
		b) Exploring of GITHUB
		c) Aptitude - I
x 1.	U23ADS402	SKILL ENHANCEMENT COURSE 2
2.		a) API design - I
* -		b) Exploring of Research Tools
		c) Aptitude - II

<sup>\*</sup> Choose any one SKILL ENHANCEMENT COURSE in the list for SEC 1, SEC 2

## Annexure – V HONOURS PROGRAMME – GENERATIVE AI

SI.	Semester	Course	Course Title	Category	Periods			Credits	Max. Marks		
No.	Semester	Code	Course Title	Category	L	Τ,	Р	Credits	CAM	ESM	Total
Theo	ry			nicia Ericia			ing the	i desend	4517		
1	IV	U23ADH401	Advanced NLP	PC	3	1	0	4	25	75	100
2	V	U23ADH502	Data Handling and Preprocessing	PC	3	1	0	4	25	75	100
3	VI	U23ADH603	Understanding Image and Audio Processing	PC	3	1	0	4	25	75	100
4	VII	U23ADH704	Generative Models	PC	3	1	0	4	25	75	100
5	VIII	U23ADH805	Desinging ML Systems	PC	3	1.	0	4	25	75	100
	Total		T1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1					20	125	375	500
Equi	valent NPTE	L courses <sup>##</sup>		4			1				= 1
1	Quantum (	Computing	all an explanation of the	1		-11.3	Ç sî lîr	3			
2	Reinforcen	nent Learning						3			
3	Applied Ac	celerated Artific	ial Intelligence					3	-	2 Weeks	6
4	Natural La	nguage Process	sing					3		Course	
5	Deep Lear	ning for Compu	ter Vision					3			

<sup>\*\*\*</sup> The student shall be given an option to earn 3 credits through one equivalent 12-week NPTEL course instead of any one course listed for honors degree programme that shall be completed before the commencement of eighth semester. The equivalent courses are subject to change based on its availability as per NPTEL course list.

## M.TECH CURRICULUM

		SE SE	MESTER - I	· V						
SI.	Course Code	Course Title	Catagoni	Periods			Cuadita	Max. Marks		
No.	Course code	Course Title	Category	L	T	Р	Credits	CAM	ESM	Total
Theo	ry	- 0 -					· ·		-TL	
1	P23MAT105	Probability and Statistics	BS	2	1	0	3	40	60	100
2	P23ADT101	Machine Learning Algorithms	PC	3	0	0	3	40	60	100
3	P23ADT102	Computing System for Data Science	PC	3	0	0	3	40	60	100
4	P23ADT103	Artificial Intelligence & Intelligent Systems	PC	3	0	0	3	40	60	100
5	P23HSTC01	Research Methodology and IPR	HS	2	0	0	2	40	60	100
6	P23ADE1XX	Professional Elective – I *	PE	3	0	0	3	40	60	100
Pract	ical	n logger and less technical		71.50	14.15				1 4	
7	P23ADP101	Machine Learning Algorithms Laboratory	PC	0	0	4	2	50	50	100
8	P23HSPC01	Technical Report Writing and Seminar	HS	0	0	4	2	100	1. A	100
Abilit	y Enhancement C	ourse	111000				41.0	Tribal		
9	P23ADC1XX	Ability Enhancement Course-I #	AEC	0	0	4	·	100	P1 -	100
10	P23ACT10X	Audit Course-I**	AEC	0	0	2	-	100	-	100
1 1	2	2		•	•		21	590	410	1000

		SEMES	TER – II							
SI.	Course Code	Course Title	Catagoni	P	erio	ds	Credits	N	lax. Mar	ks
No.		Course Title	Category	L	Т	Р	Credits	CAM	ESM	Total
Theo	ry									
1	P23ADT204	IoT and Edge Computing	PC	3	0	0	3	40	60	100
2	P23ADT205	Natural Language Processing	PC	3	0	0	3	40	60	100
3	P23ADT206	Advanced Deep Learning	PC	3	0	0	3	40	60	100
4	P23ADT207	Al and RPA	PC	3	0	0	3	40	60	100
5	P23ADE2XX	Professional Elective - II	PE	3	0	0	3	40	60	100
6	P23ADE2XX	Professional Elective - III	PE	3	0	0	3	40	60	100
Pract	tical *	har and a first section of the secti								
7	P23ADP202	Advanced Deep Learning Laboratory	PC	0	0	4	2	50	50	100
8	P23HSPC02	Seminar on ICT a hands-on approach	HS	0	0	4	2	100	-	100
Abilit	y Enhancement	Course	I THE	37.1	- '60	, i.e.	da tre in	7.50	ľ.	
9	P23ADC2XX	Ability Enhancement Course-II #	AEC	0	0	4	-	100	-	100
10	P23ACT20X	Audit Course-II**	AEC	0	0	2	-	100	- "	100
			3				22	590	410	1000

		SEMES	STER - III							
SI.	Course Code	Course Title	Category	F	erio	ds	Credits	Max. Marks		
No.	Course Code	Course Title	Category	L	T	Р		CAM	ESM	Total
Theo	ry		180						2.00	Signatur .
1	P23ADE3XX	Professional Elective – IV *	PE	3	0	0	3	40	60	100
2	P23ADE3XX	Professional Elective – V * 100	PE	3	0	0	3	40	60	100
3	P23ADE3XX	Professional Elective – VI *	PE	3	0	0	3	40	60	100
Prac	tical		1 1 2 3 3 4 5 A	31						S. L. San Br
7	P23ADW301	Project Phase - I	PA	0	0	12	6	50	50	100
8	P23ADW302	Internship	PA	0	0	0	2	100		100
Abili	ty Enhancement	Course		-	Ja.		generalists.	Ti gas f	14-4	-
10	P23ADC301	NPTEL/GIAN/MOOC	AEC	0	0	0	Lucia -	100	Tie -	100
		The state of the s	San - , Fr , -	Page 1	100	6	17	370	230	600

		SE SE	MESTER - IV							
SI.	Course Code	Course Title	Category	Periods		ds	Credits	Max. Marks		
No.				L	T	Р		CAM	ESM	Total
Pract	ical				_		111111111111111111111111111111111111111	1 1 1		
7	P23ADW403	Project Phase - II	PA	0	0	24	12	50	50	100
	1124						12	50	50	100

<sup>\*</sup> Professional Elective Courses are to be selected from the list given in Annexure I # Ability Enhancement Courses are to be selected from the list given in Annexure II

\*\* Audit Courses are to be selected from the list given in Annexure III

**BS-Basic Sciences** 

PC - Professional Core

PE - Professional Elective

HS - Humanities and Social Sciences

PA - Professional Activity

AC- Audit Course

AEC - Ability Enhancement Course

#### CREDIT DISTRIBUTION

Semester	L	П	III	IV	Total
Credits	21	22	17	12	72

Total number of credits required to complete.

M.Tech in Artificial Intelligence and Data Science:

72 credits

## ANNEXURE- I PROFESSIONAL ELECTIVE COURSES

SI. No.	Course Code	Course Title
rotess	ional Elective-I	
1	P23ADEC01	Agile and Software Project Management
2	P23ADE101	Python for Data Science
3	P23ADE102	Data Science Essentials
4	P23ADE103	Big Data Mining and Analytics
5	P23ADE104	Artificial Intelligence for Decision Making
Professi	onal Elective-II	to the second of
1	P23BDEC02	Web Analytics and Development
2	P23ADE205	Data Visualization Using Power BI
3	P23ADE206	Predictive Modelling
4	P23ADE207	Next Generation Databases
5	P23ADE208	Advanced Algorithms
Professi	onal Elective-III	
1	P23ADE209	Business Intelligence and Reporting
2	P23ADE210	Streaming Analytics
3	P23ADE211	Machine Learning with Large datasets
4	P23ADE212	R for Data Science
5	P23ADE213	Full Stack Development
Professi	onal Elective-IV	
1	P23ADE314	Intelligent Interaction
2	P23ADE315	ML and Al applications in Earth science
3	P23ADE316	Optimization for Data Science
4	P23ADE317	Virtual and Augmented Reality
5	P23BDEC02	Analytics of things
Professi	onal Elective-V	
1	P23ADE318	Nature Inspired Optimization Techniques
2	P23ADE319	Information Retrieval Techniques in Data Science
3	P23ADE320	Geo Spatial Analytics
4	P23ADE321	Game Theory for AI and Data Science
5	P23ADE322	Data Analytical Tools and techniques
rofessi	onal Elective-VI	Equilibra 1 d est 1 de la company
1	P23ADE323	Business Data Analytics
2	P23ADE324	Al in Natural Language processing
3	P23ADE325	Advanced Computer Vision
3		the same and the same are a superior of the same and the
4	P23ADE326	Real-Time Al Video Analytics

## ANNEXURE- II ABILITY ENHANCEMENT COURSES

S. No	Course Code	Course Title	Certified By
1	P23XXCX01	Adobe Photoshop	Adobe
2	P23XXCX02	Adobe Animate	Adobe
3	P23XXCX03	Adobe Dreamweaver	Adobe
4	P23XXCX04	Adobe After Effects	Adobe
5	P23XXCX05	Adobe Illustrator	Adobe
6	P23XXCX06	Adobe InDesign	Adobe
7	P23XXCX07	Autodesk AutoCAD -ACU	Autodesk
8	P23XXCX08	Autodesk Inventor - ACU	Autodesk
9	P23XXCX09	Autodesk Revit - ACU	Autodesk
10	P23XXCX10	Autodesk Fusion 360 - ACU	Autodesk
11	P23XXCX11	Autodesk 3ds Max - ACU	Autodesk
12	P23XXCX12	Autodesk Maya - ACU	Autodesk
13	P23XXCX13	Cloud Security Foundations	AWS
14	P23XXCX14	Cloud Computing Architecture	AWS
15	P23XXCX15	Cloud Foundation	AWS
16	P23XXCX16	Cloud Practitioner	AWS
17	P23XXCX17	Cloud Solution Architect	AWS
18	P23XXCX18	Data Engineering	AWS
19	P23XXCX19	Machine Learning Foundation	AWS
20	P23XXCX20	Robotic Process Automation / Medical Robotics	Blue Prism
21	P23XXCX21	Advance Programming Using C	CISCO
22	P23XXCX22	Advance Programming Using C ++	CISCO
23	P23XXCX23	C Programming	CISCO
24	P23XXCX24	C++ Programming	CISCO
25	P23XXCX25	CCNP Enterprise: Advanced Routing	CISCO
26	P23XXCX26	CCNP Enterprise: Core Networking	CISCO
27	P23XXCX27	Cisco Certified Network Associate - Level 2	CISCO
28	P23XXCX28	Cisco Certified Network Associate- Level 1	CISCO
29	P23XXCX29	Cisco Certified Network Associate- Level 3	CISCO
30	P23XXCX30	Fundamentals Of Internet of Things	CISCO

31	P23XXCX31	Internet Of Things / Solar and Smart Energy System with IoT	CISCO
32	P23XXCX32	Java Script Programming	CISCO
33	P23XXCX33	NGD Linux Essentials	CISCO
34	P23XXCX34	NGD Linux I	CISCO
35	P23XXCX35	NGD Linux II	CISCO
36	P23XXCX36	Advance Java Programming	Ethnotech
37	P23XXCX37	Android Programming / Android Medical App Development	Ethnotech
38	P23XXCX38	Angular JS	Ethnotech
39	P23XXCX39	Catia	Ethnotech
40	P23XXCX40	Communication Skills for Business	Ethnotech
41	P23XXCX41	Coral Draw	Ethnotech
42	P23XXCX42	Data Science Using R	Ethnotech
43	P23XXCX43	Digital Marketing	Ethnotech
44	P23XXCX44	Embedded System Using C	Ethnotech
45	P23XXCX45	Embedded System with IOT / Arduino	Ethnotech
46	P23XXCX46	English For IT	Ethnotech
47	P23XXCX47	Plaxis	Ethnotech
48	P23XXCX48	Sketch Up	Ethnotech
49	P23XXCX49	Financial Planning, Banking and Investment Management	Ethnotech
50	P23XXCX50	Foundation Of Stock Market Investing	Ethnotech
51	P23XXCX51	Machine Learning / Machine Learning for Medical Diagnosis	Ethnotech
52	P23XXCX52	IOT Using Python	Ethnotech
53	P23XXCX53	Creo (Modelling & Simulation)	Ethnotech
54	P23XXCX54	Soft Skills, Verbal, Aptitude	Ethnotech
55 .	P23XXCX55	Software Testing	Ethnotech
56	P23XXCX56	MX-Road	Ethnotech
57	P23XXCX57	CLO 3D	Ethnotech
58	P23XXCX58	Solid works	Ethnotech
59	P23XXCX59	Staad Pro	Ethnotech
60	P23XXCX60	Total Station	Ethnotech
61	P23XXCX61	Hydraulic Automation	Festo
62	P23XXCX62	Industrial Automation	Festo
63	P23XXCX63	Pneumatics Automation	Festo

65	P23XXCX65	Block Chain	IBM
66	P23XXCX66	Devops	IBM
67	P23XXCX67	Artificial Intelligence	ITS
68	P23XXCX68	Cloud Computing	ITS
69	P23XXCX69	Computational Thinking	ITS
70	P23XXCX70	Cyber Security	ITS
71	P23XXCX71	Data Analytics	ITS
72	P23XXCX72	Databases	ITS
73	P23XXCX73	Java Programming	ITS
74	P23XXCX74	Networking	ITS
75	P23XXCX75	Python Programming	ITS
76	P23XXCX76	Web Application Development (HTML, CSS, JS)	ITS
	1 20/0(0/(10		ITS & Palo
77	P23XXCX77	Network Security	alto
78	P23XXCX78	MATLAB	MathWorks
79	P23XXCX79	Azure Fundamentals	Microsoft
80	P23XXCX80	Azure AI (AI-900)	Microsoft
81	P23XXCX81	Azure Data (DP -900)	Microsoft
82	P23XXCX82	Microsoft 365 Fundamentals (SS-900)	Microsoft
83	P23XXCX83	Microsoft Security, Compliance and Identity (SC-900)	Microsoft
84	P23XXCX84	Microsoft Power Platform (Pl-900)	Microsoft
85	P23XXCX85	Microsoft Dynamics Fundamentals 365 – CRM	<sup>*</sup> Microsoft
86	P23XXCX86	Microsoft Excel	Microsoft
87	P23XXCX87	Microsoft Excel Expert	Microsoft
88	P23XXCX88	Securities Market Foundation	NISM
89	P23XXCX89	Derivatives Equinity	NISM
90	P23XXCX90	Research Analyst	NISM
91	P23XXCX91	Portfolio Management Services	NISM
92	P23XXCX92	Cyber Security	Palo alto
93	P23XXCX93	Cloud Security	Palo alto
94	P23XXCX94	PMI – Ready	PMI
95	P23XXCX95	Tally – GST & TDS	Tally

	96	P23XXCX96	Advance Tally	Tally
i i	97	P23XXCX97	Associate Artist	Unity
	98	P23XXCX98	Certified Unity Programming	Unity
	99	P23XXCX99	VR Development	Unity

## ANNEXURE-III

## **AUDIT COURSES**

(Common to all M.Tech Programme)

SI. No.	Course Code	Course Title								
1	P23ACTX01	English for Research Paper Writing								
2	P23ACTX02	Disaster Management								
3	P23ACTX03	Sanskrit for Technical Knowledge								
4	P23ACTX04	Value Education								
5	P23ACTX05	Constitution of India								
6	P23ACTX06	Pedagogy Studies								
7	P23ACTX07	Stress Management by Yoga								
8	P23ACTX08	Personality Development Through Life Enlightenment Skills								
9	P23ACTX09	Unnat Bharat Abhiyan								

# Annexure – III B.Tech and M.Tech I and II Semester Syllabus R-2023

Department	Mathe	matics	Progr	amme	: B.Te	ch.			gallen har
Semester	i dia		Cours	e Cat	egory:	BS	End Semeste	r Exam Ty	oe: TE
Course Code	U23M	ATC01	Per	iods/V	Veek	Credit	Max	cimum Ma	rks
			e e e	FT	Р	С	CAM	ESE	TM
Course Name		eering Mathematics – I	3	1		4	25	75	100
		L Branches Except CSBS)		1 77 7			Cathorino, s.		
Prerequisite	Basic	Mathematics		Lak			i de de Anderl	tac. 558 [66	Mary 18
		On completion of the co	ourse, the	stude	nts wi	ll be able	to	BT Ma	
	CO1	Understand the concept of Eige						(Highes	
		Matrix	cii values e	iiu Li	gen ve	ciors, Diag	gorialization of	a page N	J
Course Outcomes	CO2	Solve higher order differential e	equations				. Assembly and	K	3
Outcomes	CO3	Understand the different types	of partial d	fferer	itial equ	uations		K	3
	CO4	Know about the Applications of	f double ar	d trip	le inted	ırals		K	3
	CO5	Gain the knowledge about Vec		1	_			K	
UNIT – I	Matric		tor Galdala	o dila	ito / tpp	Periods:	12	1	J
		of Linear Equations – Characteristic	equation -	Cayley	Hamilt			and Figor	CO1
vectors of a real M	atrix – Dia	gonalization of Matrices.	- quality	ouj.oj	· Idillill	on medici	n Eigen values	and Ligen	COI
UNIT – II	Differe	ential Equations (Higher Order)	)		1	Periods:	12		<u> </u>
		of higher order with constant coe	Ž.	uler's	linear e			th variable	CO2
coefficients – Meth	od of Varia	ation of parameters.		u.o. 0	our	oquation of	mgner order wi	tii vallable	002
UNIT – III	Functi	ons of Several Variables		***************************************	-	Periods:	12		<u> </u>
Partial derivatives :	– Total der	ivatives – Maxima and Minima of tw	o variables -	- Lagra	l s'anne	Method of n	nultipliere		CO3
UNIT – IV		le Integrals	- variables	Lagic	ange 3 n	Periods:			<u> </u>
		of order of integration (Cartesian fo	rm) Applica	tions.	Area a			an form)	CO4
Volume as a triple	integral (C	artesian form).		tiono.	71100 0	o a double	integral (Cartesi	an ioini) –	C04
UNIT – V		Calculus				Periods:			
Gradient – Diverge - Gauss Divergend	ence and C ce Theoren	curl – Directional derivatives – Irrota n and Stoke's Theorem (without prod	tional and S ofs).	olenoi	dal vect	or fields –	Properties (State	ement only)	CO5
Lecture Periods	s: 45	Tutorial Periods: 15	Practi	cal Pe	eriods:		Total Peri	ods: 60	
Text Books			I			No. 100 100 100 100 100 100 100 100 100 10			****
1. M.K. Ver	nkatarama	n, "Engineering Mathematics", T	he Nationa	l Pub	lishing	Company	, 2 <sup>nd</sup> Edition Ch	ennai, 201	6.
2. N. P Bali	and Man	ish Goyal, "A Text Book of Engin							
Edition, 2	2018.						,		
<ol> <li>S. Naraya</li> <li>S. Printe</li> </ol>	anan and rs & Publi	T.K. Manickavasagam Pillay," Di shers Pvt Ltd, 2009.	πerential E	quatic	ns and	ts Applic	ations", Viswar	nathan.	
Reference Book		onord 1 vt Ltd, 2000.						ATTICKED	
Commence of Section 19 and 19		s and Calculus (Engineering Mat	hematics -	I)" Ba	laii Pu	blications	9 <sup>th</sup> Edition Jun	e 2023	
		Ingineering Mathematics – I", Me							
		dvanced Engineering Mathemati					***		
		ther Engineering Mathematics",					h Edition 2018		
		neering Mathematics", A Program							
Veb References			7				6		
		a/yaoguo/math1025/slides/chapt	er/kuttler-li	neara	lgebra	–slides- s	vstems of equa	tion-hando	out ndf
		um.edu/~wn0g/2ch6a.pdf		ara	.90514	511400 3	Jotomo or Equa	- I and	ut.pui
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		courses/111/108/111108081/	7						-
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COs/POs/PSOs Mapping

COs	Program Outcomes (POs)											Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	120	2	1	.1	10.4				1	3	10 c=175	
2	3	2	1	1	-	1	11		5 <u>-</u> 1			1	3	nose the	erde <u>a</u> je
3	3	2	11	1	-	1	1		15-14		4 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	4.01	3		
4	3	2	11	1	-	1	1	. = .	L Elli		est <del>a</del> test	1	3		2 Y H / P
5	2	2	1		## U.V.		1		T 101 12	The state of the s		1	3	- Lait <del>g</del>	

Correlation Level: 1 - Low, 2 - Medium, 3 - High

		Contin	uous Asse	ssment Marks (C	CAM)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Semester			C-		B.Ted		F-10	<u> </u>	
Ocinestei	1/11			e Cate			End Semester		e: TE
Course Code	U23E	STC03		riods/W	<del></del>	Credit		num Marks	-
* * **********************************			L	724 <b>T</b> ; 1	P	С	CAM	ESE	TN
Course Name		es of Electrical and Electronics neering	3	0	0	3	25	75	100
low was the	(Co	mmon to CSE, IT, MECH, CIVIL, M	CTR, C	CE, Ala	&DS, F	T and CS	BS Branches	<u> 1                                   </u>	
Prerequisite		ematics and Physics		- 5,01	, 4 ( )	August 1	de alemandador.		auditi.
distributo a	On co	mpletion of the course, the studer	nts will	be able	to	spensed it also	e o. a sagrança A sagranda kalana	BT Ma (Highest	pping Leve
	CO1	Apply the basic concepts and vario	ous laws	in DC	circuits	S		K	3
Course	CO2	Analyze the AC circuits and develor receiver circuits.						K	3
Outcomes	соз	Gain the knowledge of power systemeasures and real time application					electrical safety	K	2
	CO4	Understand the operator of semico	nducto	diode	and its	application	ns.	K	2
	CO5	Explain the characteristics and ope	eration o	of BJT a	and FE	Т.		K	2
	CO6	Relate and Explain Different Comm				l'signine "		K2	2
		Section A – Ele	ectrical	Engine	eering				
UNIT - I	1	ircuits erence, Current, Resistance, Inductance	-			Periods:		5402	
sources - ideal parallel combina transformation,	and praction of F Network	ctical sources - concept of dependent R, L, C components, Voltage Divider an Theorems - Superposition, Thevenin, No	and inde	nt Divide	er Rules	s, Mesh and	Nodal analysis	law, Series , Star/Delta	CO
sources - ideal parallel combina transformation, UNIT - II  AC waveform depolar and rectal Resonance in s	and pra- ation of F Network  AC Ci efinitions ngular fo eries an	ctical sources - concept of dependent R, L, C components, Voltage Divider an Theorems - Superposition, Thevenin, Noticuits - form factor, peak factor, R-L, R-C, RL rm, concept of impedance, admittance d parallel circuits, band-width and qual	and inde	nt Divided Maxim	R-L-C	s, Mesh and wer Transfer Periods: parallel circurent and co	Nodal analysis  8  uit, phasor repre	, Star/Delta	
sources - ideal parallel combina transformation, UNIT - II  AC waveform depolar and rectal Resonance in s	and praction of F Network AC Ci efinitions ngular fo eries and ment – T	ctical sources - concept of dependent R, L, C components, Voltage Divider an Theorems - Superposition, Thevenin, Noticuits  - form factor, peak factor, R-L, R-C, RL rm, concept of impedance, admittance d parallel circuits, band-width and qual two Wattmeter method.	and inde of Currer orton and C series , active, ity factor	nt Divided Maxim	R-L-C	Periods: parallel circurent and co	Nodal analysis  8  uit, phasor repre mplex power, po AC Circuits (Υ-Δ	, Star/Delta	CO
sources - ideal parallel combina transformation, UNIT - II  AC waveform depolar and rectal Resonance in sever Measures  UNIT - III  Layout of electronsulators and composition of the principle, load to the principle, load to the principle, load to the principle, load to the principle in the prin	and praction of F Network  AC Ci efinitions ngular for eries and ment – T  Electro Electro est and p	ctical sources - concept of dependent R, L, C components, Voltage Divider and Theorems - Superposition, Thevenin, Noticuits  - form factor, peak factor, R-L, R-C, RL rm, concept of impedance, admittance d parallel circuits, band-width and qual two Wattmeter method.  Tical Safety and Electrical Machine wer system and its functions, Wiring A afety devices - fuse, relay and circuit brest imagnetic induction, Fleming's Right and performance characteristics - Auto transition start and run induction motor — Load	and inded Current or and Current or and Current or and Current or active, active, ity factor of the Current of	nt Divided Maxim s circuit, reactive, Three ies, Typensors a and rule Single p	R-L-C e, appa Phase pes of nd its ty - DC (	Periods: parallel circurent and co balanced A  Periods: domestic w ypes. Generator al ransformer-	I Nodal analysis  8  uit, phasor repre mplex power, po AC Circuits (Y-\Delta  7  iring, Necessity	sentation in ower factor, and Y-Y) -	CO
sources - ideal parallel combina transformation, UNIT - II  AC waveform do polar and rectal Resonance in s Power Measure:  UNIT - III  Layout of electinsulators and composition of the principle, load to test - Single pha	and praction of F Network  AC Ci efinitions ngular for eries and ment – T  Electro cal power ables, Sa of electro est and present and pres	ctical sources - concept of dependent R, L, C components, Voltage Divider and Theorems - Superposition, Thevenin, Noticuits  - form factor, peak factor, R-L, R-C, RL rm, concept of impedance, admittance d parallel circuits, band-width and qual two Wattmeter method.  - rical Safety and Electrical Machine were system and its functions, Wiring A afety devices - fuse, relay and circuit bree imagnetic induction, Fleming's Right and performance characteristics - Auto transporter start and run induction motor — Loan	and inded Current orton and Current orton orton and Current orton	nt Divided Maxim s circuit, reactive, Three ies, Typensors a and rule Single p	R-L-C e, appa Phase pes of nd its ty - DC (	Periods: parallel circinent and combalanced American way pes. Generator and combalanced American way pes. Generator and combalanced American way pes. Generator and combalanced American way pes.	I Nodal analysis  8  uit, phasor repre mplex power, po AC Circuits (Y-\Delta  7  iring, Necessity and DC Motor - construction, pri	sentation in ower factor, and Y-Y) -	CO
sources - ideal parallel combina transformation, UNIT - II  AC waveform depolar and rectal Resonance in s Power Measures  UNIT - III  Layout of electrinsulators and caraday's Law of principle, load to test - Single pha	and praction of F Network  AC Ci efinitions ngular for eries and ment – T  Electro est and process and	ctical sources - concept of dependent R, L, C components, Voltage Divider and Theorems - Superposition, Thevenin, Noticuits  - form factor, peak factor, R-L, R-C, RL rm, concept of impedance, admittance diparallel circuits, band-width and qual two Wattmeter method.  Ical Safety and Electrical Machine wer system and its functions, Wiring A affety devices - fuse, relay and circuit brest induction, Fleming's Right and performance characteristics - Auto transpositor start and run induction motor — Load Section B — Electromacter of the system of t	and inded Current orton and Current orton and Current orton and Current orton and Current orton	nt Divided Maxim s circuit, reactive r, Three ies, Typensors a and rule Single p	R-L-C a, appa Phase pes of nd its ty - DC (	Periods:  Periods:  parallel circurent and co balanced A  Periods:  domestic w ypes.  Generator and ransformer-  Periods:	Nodal analysis  8  uit, phasor repremplex power, p	sentation in ower factor, and Y-Y) - of earthing, construction, inciple, load	cos
sources - ideal parallel combina transformation, UNIT - II  AC waveform depolar and rectal Resonance in seconance in secon	and pradation of F Network  AC Ci efinitions ngular for eries and ment – T  Electro est and prades and process and	ctical sources - concept of dependent R, L, C components, Voltage Divider and Theorems - Superposition, Thevenin, Noticuits  - form factor, peak factor, R-L, R-C, RL rm, concept of impedance, admittance d parallel circuits, band-width and qual wo Wattmeter method.  rical Safety and Electrical Machine ver system and its functions, Wiring A affety devices - fuse, relay and circuit bre imagnetic induction, Fleming's Right and performance characteristics - Auto transcitor start and run induction motor - Load Section B - Electronal Components - Doping - Intrinsic and and depletion capacitance - Rectifier, I - Light Emitting Diode (LED) - Solar Celectrons	and inded Current orton and Current orton	nt Divided Maxim s circuit, reactive r, Three ies, Typensors a and rule Single p s Engin	R-L-C e, appa Phase of nd its ty - DC (whase transcending inconduit wave	Periods:	Nodal analysis  8  uit, phasor repre mplex power, po AC Circuits (Y-\Delta  7  iring, Necessity  nd DC Motor - c construction, pri  7  junction diode ener diode chara  7	sentation in ower factor, and Y-Y) - of earthing, construction, inciple, load	cos
sources - ideal parallel combina transformation, UNIT - II  AC waveform depolar and rectal Resonance in seconance in secon	and pradation of F Network  AC Ci efinitions ngular for eries and ment – T  Electro est and pradation est and prade sectors and process an	ctical sources - concept of dependent R, L, C components, Voltage Divider and Theorems - Superposition, Thevenin, Noticuits  - form factor, peak factor, R-L, R-C, RL m, concept of impedance, admittance d parallel circuits, band-width and qual wo Wattmeter method.  - fical Safety and Electrical Machine wer system and its functions, Wiring A affety devices - fuse, relay and circuit breomagnetic induction, Fleming's Right and performance characteristics - Auto transported to start and run induction motor - Load Section B - Electron Machine were system and run induction motor - Load Section B - Electron B - Electron Machine were start and run induction motor - Load Section B - Electron Machine with the system and depletion capacitance - Rectifier, K - Light Emitting Diode (LED) - Solar Ce	and inded Current orton and Current orton	nt Divided Maxim s circuit, reactive r, Three ies, Typensors a and rule Single p s Engin	R-L-C c, appa Phase of nd its ty - DC (whase transcendent wave on Emit JFET),	Periods:	Nodal analysis  8  uit, phasor repre mplex power, po AC Circuits (Y-\Delta  7  iring, Necessity  nd DC Motor - c construction, pri  7  junction diode ener diode chara  7  in collector Cont	sentation in ower factor, and Y-Y) - of earthing, construction, inciple, load , structure, acteristics -	cos
sources - ideal parallel combinateransformation,  UNIT - II  AC waveform depolar and rectal Resonance in sepower Measures  UNIT - III  Layout of electrinsulators and carriaday's Law of principle, load tetest - Single pharmal carriation ser characteristics - zener diode as rectal UNIT - V  Bipolar Junction characteristics - Transistor, EMO  UNIT - VI	and praction of F Network  AC Ci efinitions Ingular for eries and practical powers ables, Sa of electro est and practical powers as capacity  Semic iniconduct diffusion egulator  Transis Biasing SFET-Di  Committed Tation	ctical sources - concept of dependent R, L, C components, Voltage Divider and Theorems - Superposition, Thevenin, Noticuits  - form factor, peak factor, R-L, R-C, RL rm, concept of impedance, admittance of parallel circuits, band-width and qual wo Wattmeter method.  Tical Safety and Electrical Machine were system and its functions, Wiring A factor devices - fuse, relay and circuit bree magnetic induction, Fleming's Right and performance characteristics - Auto transpositor start and run induction motor - Load conductor Diodes And Application and depletion capacitance - Rectifier, I - Light Emitting Diode (LED) - Solar Ceistors  tor - construction - operation - Common - numerical application. Junction Field EMOSFET operation characteristics - Numerication Systems	and inded Currence orton and currence orton	nt Divided Maxim s circuit, reactive r, Three ies, Typensors a and rule Single p s Engin asic Sere e and Fu Commonsistor (	R-L-C e, appa Phase of nd its to hase transcendiall wave on Emit JFET), on.	Periods:	Nodal analysis  8  uit, phasor repre mplex power, po AC Circuits (Y-\Delta  7  iring, Necessity  nd DC Motor - construction, pri  7  junction diode ener diode chara  n collector Consemiconductor	sentation in ower factor, and Y-Y) - of earthing, construction, inciple, load , structure, acteristics - figuration — Field Effect	co
sources - ideal parallel combinateransformation,  UNIT - II  AC waveform depolar and rectal Resonance in second power Measure UNIT - III  Layout of electrinsulators and carriaday's Law of principle, load tetest - Single phater in the second power Measure UNIT - IV  Introduction ser characteristics - zener diode as rectal unit - V  Bipolar Junction characteristics - Transistor, EMO  UNIT - VI  Need for Modu Comparison of Comparison o	and praction of F Network  AC Ci efinitions Ingular for the price of t	ctical sources - concept of dependent R, L, C components, Voltage Divider and Theorems - Superposition, Thevenin, Noticuits  - form factor, peak factor, R-L, R-C, RL rm, concept of impedance, admittance of parallel circuits, band-width and qual wo Wattmeter method.  - rical Safety and Electrical Machine ver system and its functions, Wiring A afety devices - fuse, relay and circuit bree remagnetic induction, Fleming's Right and performance characteristics - Auto transporter start and run induction motor - Load conductor Diodes And Application and depletion capacitance - Rectifier, I Light Emitting Diode (LED) - Solar Ceistors  - construction - operation - Common - numerical application, Junction Field EMOSFET operation characteristics - Numerical Application characteristics - Numerical Superation Characteristics - Numerical Application	and inded Currence orton and Currence orton	nt Divided Maxim s circuit, reactive r, Three ies, Typensors a and rule Single p s Engin nsic Ser e and Fu Commonsistor ( pplication	R-L-C e, appa Phase pes of nd its ty - DC (shase transcondull wave) pn Emit(JFET), pn.  AM, Fr ital con	Periods:	I Nodal analysis  8  uit, phasor repre mplex power, po AC Circuits (Y-\Delta  7  iring, Necessity and DC Motor - construction, pri  7  junction diode ener diode chara  7  in collector Consemiconductor  initions and Wasystem - Elect	sentation in ower factor, and Y-Y) - of earthing, construction, inciple, load , structure, acteristics - figuration – Field Effect	CO

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- 5. https://nptel.ac.in/courses/117/102/117102059

COs/POs/PSOs Mapping

COs	an Jose J. Na		1-17 - 1 ABT - 1	5 = . 	Prog	ram O	utcom	es (PO	s)					ram Spo omes (P	
ou, ite	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	-	2	-	-		-	-	-	1	3	2	
2	3	3	3	=	2	-	-		1	-		1	3	2	
3	3	3	3	-	2	ren I			-			1	3	2	t di <del>-</del> bu
4	3	3	3	=	2	-	14.1	-	-	-	-	1	3	2	713-201-1
5	3	3	3		2	8-1			-u		-	_1	3	2	ELEV.

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Mangal or or such as	1 1 1	Cont	inuous Assess	ment Marks (CA	M)	End	i ganna
Assessment	CAT 1	ÇAT 2	Model Exam	Assignment*	Attendance	Semester Examination (ESE) Marks	Total Marks
Marks	5	5	5	5	5	75	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	Comp	outer Science and Engineering	Prog	ramm	ne: B.T	ech.			
Semester	1/11		Cour	se Ca	ategory	: ES	End Semester E	Exam Type:	TE
Course Code	U23C	Max	imum Mark	S					
	1949	CAM	ESE	TM					
Course Name	Progr	amming in C	3			3	25	75	100
	r Pi	(Commo	n to All	Bran	ches)			i jan	- : - ::
Prerequisite	NIL			N (6) (4) 	That!		a to the second and the second		
	On co	mpletion of the course, the stude	ents wi	ll be	able to			BT Ma (Highes	
Course	CO1	Comprehend the basics of Comp	uters.					K	
Outcomes	CO2	Illustrate the concepts of control s	structure	es an	d loopi	ng.		K	2
	CO3	Implement programs using arrays	and fu	nctio	ns.			К	3
	CO4 Demonstrate programs using Structure and Pointers.								3
	CO5 Build the programs using Union and File management Operations.								3
UNIT-I									
		ation of Computers - Block Diagram					Software - Netwo	rk Structure	- CO
		- Decimal - Conversion - Algorithm -	Pseudo	code					
UNIT-II		gramming Basics amming – Basic structure of a 'C' prog	rom o	ompile		Periods: 0		to Variables	
Data Types – Ex	pression	ns using operators in 'C' – Managing	Input ar	nd Out	put ope	erations – [	Decision Making an	d Branching	- CO2
_ooping statemer		a and Eurotions				Dariada, O	10		
	1	s and Functions			1	Periods: 0			
Arrays — Inilializa Simple programs	sorting	Declaration – One dimensional and Tog- g- searching – matrix operations- Fun	wo aime	dofinit	ar array	rs. String- (	String operations –	String Arrays	5.
/alue – Pass by r			Clion –	demin	1011 01 1	iunction – t	Deciaration of funct	1011 - Fass L	y CO.
UNIT-IV	Struc	ture and Pointers			1	Periods: 0	9		L
		Structure definition - Structure decla							
Pointers - Definiti programs.	on – Init	ialization – Pointers arithmetic – Pointe	ers and	arrays	-Pointe	er to Functi	on –Pointer and Str	ucture- Simpl	е
UNIT-V	Unior	is and Files		-		Periods: 0	9		
		grams Using Structures and Unions							
Functions - Rand Directives- Dynar		cess to Files - File System Functions	- Comi	mand	Line A	rguments-	Storage Classes -	Pre-Processo	or
Lecture Perior		Tutorial Periods:	Pra	actica	al Perio	ods:	Total Peri	ods: 45	
Text Books	I gi								and the state of t
1. → Balagui	rusamy	. E, "Programming in ANSI C", Tata	a McGra	aw Hil	I, 8 <sup>th</sup> E	dition, 201	19.	***************************************	
<ol><li>Yashva</li></ol>	ntKane	tkar, "Let us C", BPB Publications,	16 <sup>th</sup> Ed	ition,	2017				
3. Herbert Reference Boo		t," C: The Complete Reference", Mo	cGraw I	Hill, 4	" Edition	on, 2014		-	
		val Jyoti P. Mirani, "Computer Fund	lamant	olo"	Niroli F	)rokoobon	2010		
Vikas E     Ashok	s. Agarv N Kamt	hane, "Computer Programming", P	earson	ais , i educ	ation 2	<sup>riakasnan</sup> ,	, 2019, sion 2012		
3. VikasV	erma, "	A Workbook on C ", Cengage Lear	ning, 2 <sup>n</sup>	d Edit	ion, 20	)12.	0.011, 2012.		
		vasan and S.Koteeswaran, "Funda	amenta	ls of (	Compu	ting and F	Programming", 4 <sup>th</sup>	Edition, Sri	Krishr
Publica 5. Pradipt		:012. anasGhoush, "Programming in C", 2	ond Edit	ion C	vford I	University	Proce 2011		
Neb Reference		anasonousii, Fiogramming in C , 2	z Luit	ion, C	XIOIU	University	F1655, 2011.		
		ogramiz.com/c-programming	!			***************************************			
		eksforgeeks.org/c-language-set-1-	introdu	ction/					
		orialspoint.com/cprogramming							
4 1 11									
		signment2do.wordpress.com//so .in/courses/106/104/106104128/	lution-p	rogra	mming	-in-ansi-c			

#### COs/POs/PSOs Mapping

COs	6		THE RES		Prog	ram O	utcom	es (PO	s)	9.7				ram Spe omes (P	
1446	P01	PO2	PO3	P04	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1	[14. E4]	+	3			ila <del>-</del> u		1			3		3
2	2	1		ji ka	3		3 8	N. 14.35	r 6		44.018	4 4.	3	4.48	3
3	3	2	1	13	3	100 <b>-</b> 000	13 = 12 ·		$(B_{ij}\Delta_{ij})$	344 E	178 Liver	bu A <sub>z</sub> táru	3	-	3
4	3	2	1	1.3	3	2.47	V=	nij <del>e</del> vo			100-100	nih znál	3		3
5	3	2	1	1	3	- 1	A. T		T 7	ringing.		7. 1-1.	3	- 203	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

	1 5-44	Cont	inuous Assess	ment Marks (CA	M)	End	
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Semester Examination (ESE) Marks	Total Marks
Marks	5	5	5	5	5	75	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	Artific	ial Intelligence and Data Science	Prog	ramm	ne: <b>B.T</b>	ech.	Ar good off and the		regific to
Semester	I .		Cour	se Ca	ategory	: ES	End Semester E	xam Type:	TE
Course Code	U23AE	)T101	Perio	ds / V	Veek	Credit	Max	imum Mark	S
			L	T	Р	С	CAM	ESE	TM
Course Name	Digital	System Design	3	17		3	25	75	100
			(AI &D	S)	<del></del>				
Prerequisite	NIL			An					
	On con	npletion of the course, the stude	nts wi	ll be	able to			BT Ma (Highes	
Course Outcomes	CO1	Review the knowledge of Number functions.	er syste	ms a	nd sim	plifications	of Boolean	К	
	CO2	Design and understand the vario	us com	nbinat	tional lo	ogic circuit	5.	K	2
	CO3	Design and understand the vario	us seq	uentia	al circu	iits.	. Telegraph of Armes	K	2
	CO4	Analyze and design the reconfigu	uration	circu	its.	000		К	3
	CO5	Review the knowledge of Number functions.	er syste	ms a	nd sim	plifications	of Boolean	К	3
UNIT-I	Reviev	v of Number Systems	W-1-		F	Periods: 1	2		
orms. UNIT-II Simplifications of	<b>Boolea</b> Boolean	and Compliment representations – Ban Function and Combinational I function: Theorems and laws – K"M:	Logic I	<b>Desig</b> Quine	n F	Periods: 12	2 d – Introduction to a	combination	al CO2
		res of Combinational circuits – Adder er – Demultiplexer.	rs - Sub	tracto	rs – Bi	nary paralle	Adder – Decoder	<ul><li>Encoder</li></ul>	4
UNIT-III		ntial Logic Design			F	Periods: 12	)		<u> </u>
ntroduction to Se D, and T Flip-Flop Shift registers – T	ps – Exci	Circuits – Latches – Types of Latches tation table of Flip-Flops. Counters: A Shift registers.	: SR La	tch an	d D Lat Counte	tch – Flip-Fl ers – Synchi	op – Types of Flip-Fronous counters – N	lops: RS, Jk lod counters	CO3
UNIT-IV	Recon	figuration Digital Circuits			F	Periods: 12	2		
RAM - ROM. Pi	rogramm	ation Digital Circuits – Memory – Hier able Logic Devices: Programmable g RAM, ROM, PLA and PAL.	archy of Logic A	f Mem	iory – F – Progr	RAM - Type rammable A	s of Ram – Memory krray Logic – Imple	Decoding of the Decoding of th	of CO4
UNIT-V	VHDL					Periods: 12			
		Description Language and VHDL – gnals and data types.	Design	l flow	– Enti	ity, architect	ture, process, confi	guration an	d CO5
Lecture Period	ls: 45	Tutorial Periods: 15	Pra	ctica	l Perio	ods:	Total Perio	ds: 60	1
Text Books			1		Tana tana		1	***************************************	
	is Mano	and Michael Ciletti, "Digital Design	n", Pea	rson	India E	ducation S	ervices, Pvt. Ltd.,	Sixth Edition	on,
2018. 2. Stepher Education	Brown	and ZvonkoVranesic, "Fundament	tals of [	Digita	l Logic	with VHDL	. Design", Tata Mo	Graw Hill	
		"Fundamentals of Logic Design",	Thoma	s Pul	olicatio	n Compan	y, 7 <sup>th</sup> Edition, 2011	١.	
Reference Boo		<u> </u>						Z ×	
1. Tocci R	J and W	/idmer N S, "Digital Systems - Prir	ciples	and A	pplica	tions", Prer	ntice Hall of India,	11 <sup>th</sup> Edition	1, 2010
		"Digital Design Principles and Pra							
		"Schaum's Outline of Digital Princugh, "Digital Logic: Applications are						4.	
4. John. M	. I albio	ugn, Digital Costs Desire" Tests	iu Des	ıyıı, (	enga	ge Learning	y, Reprint 2009.		

- 5. Godse A.P.Godse, "Digital System Design", Technical Publications, 1st edition, 2008.

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- https://academic.csuohio.edu/chu\_p/rtl/chu\_rtL\_book/silde/chap01\_1.pdf
- https://bohr.wlu.ca/nznotinas/pc319/lectures/01%20digital\_system\_design.pdf

COs/POs/PSOs Mapping

COs	i er "Š	E .			Prog	ram O	utcom	es (PO	s)	<u> </u>	n a,			ram Spe omes (P	
95/2	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	2	2	2	1	Fit)	74	17 <del>.</del> +		14 - 1 <u>2</u> 3 / 2 / 3	1111	4-	2	3	2
2	3	3	3	3	3	6. July 1	- ·	v. 1 <del>.</del> —		~ - La Te		j	3	3	2
3	3	3	3	3	3	565-765 31 <del>-</del> 1	-			- 1	9- <del>-</del> -	. T = T	2	2	2
4	3	3	3	3	3		€. <del>-</del> 1		-15 (A		-		2	3	3
5	2	2	2	2	1	( - C_) ( )	21		Marie Alex	3-4-3-4	1975 <u>-</u> 196		3	3	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

	3	Contin	uous As	sessment Mark	s (CAM)	End	2
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Semester Examination (ESE) Marks	Total Marks
Marks	1	0	5	5	5	75	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

	Artificial Intelligence and Data Science		nme: <b>B.</b>					
Semester		Course			End		er Exam Ty	•
Course Code	U23ADT102	Perio	ds / We		Credit	<del></del>	Maximum N	
Course Name	Fundamental Of Data Science	L	T	P	С	CAM	ESE	TM
Course Name		3	- 1	- 1	3	25	75	100
Droroguiaita	NIL A	I & DS						
Prerequisite	Section 2015 and the second section of the section of the second section of the section of the second section of the se							
wite surre	On completion of the course, the studen	ts will be	able to				BT Ma	pping
Course							(Highes	t Leve
Outcome	CO1 Infer the Real world data and information	ation.			P		K	
	CO2 Applying Data Science using Excel.	T. Wasai Ye					К	3
	CO3 Make use of Mathematical Knowledge	ge for prol	olem sol	ving.		4-4	К	2
	CO4 Interpret the various Tools and its ac	lvantage.			o of Agreem		К	3
	CO5 Illustrate the different opportunities in	n Industrie	es.				K	2
UNIT-I	Introduction to Data Science ta Science – History of Data Science – Relation				Periods: 09			7
reprocessing.	ctured vs Unstructured data – Quantitative vs Qu		ia – me		. paci	TAN AR	oction – Dati	a
UNIT-II	Data Science in Excel cel basic functions – Data Collection and Prepara		and the		Periods: 09		***************************************	
UNIT-III	Mathematical Preliminaries				Periods: 09			1
Probability: Proba Descriptive Statist Correlation Analys	Mathematical Preliminaries bility vs. Statistics – Compound Events and Indep ics: Centrality Measures – Variability Measures – sis: Correlation Coefficient – The Power and Sign bilities – Logarithms and Ratios – Logarithms and	Interpretir ificance –	ng Varian Detection	onal Prob ce – Cha Periodic	pability – Prob gracterizing D cities. Logarit	ability Dis	S.	cos
Probability: Proba Descriptive Statist Correlation Analys Multiplying Probab	bility vs. Statistics – Compound Events and Indepics: Centrality Measures – Variability Measures – sis: Correlation Coefficient – The Power and Sign	Interpretir ificance –	ng Varian Detection	onal Prob ce – Cha Periodic ed Distrib	pability – Prob gracterizing D cities. Logarith autions	pability Dis istribution hms: Loga	S.	CO3
Probability: Probablescriptive Statist Correlation Analys Multiplying Probable UNIT-IV Introduction to Da	bility vs. Statistics – Compound Events and Indepics: Centrality Measures – Variability Measures – sis: Correlation Coefficient – The Power and Sign bilities – Logarithms and Ratios – Logarithms and	- Interpretir ificance – I Normalizi	ng Varian Detection ng Skewe	onal Prob ce – Cha Periodic ed Distrib	pability – Prob gracterizing D cities. Logarith outions Periods: 09	pability Dis istribution hms: Loga	s. arithms and	
Probability: Probablescriptive Statist Correlation Analys Multiplying Probable UNIT-IV Introduction to Da	bility vs. Statistics – Compound Events and Indepics: Centrality Measures – Variability Measures – sis: Correlation Coefficient – The Power and Sign bilities – Logarithms and Ratios – Logarithms and Data Science Tools	- Interpretir ificance – I Normalizi	ng Varian Detection ng Skewe	onal Prob ce – Cha Periodic ed Distrib	pability – Prob gracterizing D cities. Logarith outions Periods: 09	pability Dis istribution hms: Loga	s. arithms and	
Probability: Probablescriptive Statist Correlation Analys Multiplying Probable UNIT-IV Introduction to Date Data Science.	bility vs. Statistics – Compound Events and Indepics: Centrality Measures – Variability Measures – Sis: Correlation Coefficient – The Power and Sign bilities – Logarithms and Ratios – Logarithms and Data Science Tools  ta Science Tool – Data Cleaning Tools – Data Milling Tools – Da	Interpretir ificance –	ng Varian Detection ng Skewe	onal Prob ce – Cha i Periodic ed Distrib	pability – Probaction of the P	pability Disistribution  hms: Loga	s. arithms and ols – Tools	
Probability: Probable Probability: Probable Probability: Probable	bility vs. Statistics – Compound Events and Indepics: Centrality Measures – Variability Measures – Sis: Correlation Coefficient – The Power and Sign bilities – Logarithms and Ratios – Logarithms and Data Science Tools  ta Science Tool – Data Cleaning Tools – Data Miles	Interpretir ificance – Interpretir ificance – Interpretir ificance – Interpretir ificance – Interpretir interpreti	ng Varian Detection ng Skewe I Modellin ustry – D	onal Prob ce – Cha n Periodic ed Distrib ng Tools - ata Servi	pability – Prob practerizing D cities. Logarith utions  Periods: 09  - Data Visual  Periods: 09  ces – Data S	pability Disinguishing Distribution Cogaring Control C	s. arithms and ols – Tools oplication: reative	CO4
Probability: Probable Sescriptive Statist Correlation Analys Multiplying Probable UNIT-IV Introduction to Date or Data Science.  UNIT-V Data Economy and Introduction – Gerolesign and Huma	bility vs. Statistics – Compound Events and Indepics: Centrality Measures – Variability Measures – Sis: Correlation Coefficient – The Power and Signoilities – Logarithms and Ratios – Logarithms and Data Science Tools  ta Science Tool – Data Cleaning Tools – Data Modern Measures – Data Cleaning Tools – Data Modern Measures – Data Cleaning Tools – Data Modern Measures – Introduction: Data Economy Deral Application Guidance – Different Domain – Application Guidance – Different Domain –	Interpretir ificance – I Normalizing unging and Dications – Data Ind Advertising cology and	ng Varian Detection ng Skewe I Modellin ustry – D	onal Prob ce – Cha i Periodic ed Distrib ng Tools - ata Servi pace and ment – E	pability – Probatoracterizing Districtions  Periods: 09  - Data Visual  Periods: 09  ces – Data S  Astronomy -  commerce ar	pability Disistribution hms: Logation ization To cience Ap - Arts - Ciend Retail -	s. arithms and ols – Tools oplication: reative	CO4
Probability: Probable Probability: Probable Probability: Probable	bility vs. Statistics – Compound Events and Indepics: Centrality Measures – Variability Measures – Sis: Correlation Coefficient – The Power and Signoilities – Logarithms and Ratios – Logarithms and Data Science Tools  ta Science Tool – Data Cleaning Tools – Data Moderate Science Tool – Data Cleaning Tools – Data Moderate Science Tool – Introduction: Data Economy deral Application Guidance – Different Domain – Inities – Bioinformatics – Consulting Services – Einance and Economy – Gaming.	Interpretir ificance – I Normalizing unging and Dications – Data Ind Advertising cology and	ng Varian Detection ng Skewe I Modellin ustry – D I – Aeros I Environ	onal Prob ce – Cha i Periodic ed Distrib ng Tools - ata Servi pace and ment – E	pability – Probatoracterizing Districtions  Periods: 09  - Data Visual  Periods: 09  ces – Data S  Astronomy -  commerce ar	pability Disistribution hms: Logation ization To cience Ap - Arts - Ciend Retail -	s. arithms and ols – Tools oplication: reative - Education	CO4
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Probability: Probable Probability: Probable Probability: Probable	bility vs. Statistics – Compound Events and Indepics: Centrality Measures – Variability Measures – Sis: Correlation Coefficient – The Power and Sign bilities – Logarithms and Ratios – Logarithms and Data Science Tools  ta Science Tool – Data Cleaning Tools – Data Milities – Consulting Services – Enance and Economy – Gaming.  Industrialization – Introduction: Data Economy – Industrialization – Introduction: Data Economy – Industrialization – Consulting Services – Enance and Economy – Gaming.  Tutorial Periods:  Shah, "A Hands on Introduction to Data Science", Packt Forman – Introduction of Data Science and Economy – Gaming.  Shah, "A Hands on Introduction to Data Science", Packt Forman – Introduction to Data Science and Economy – Gaming.	Interpretir ificance – I Normalizi unging and Dications – Data Ind Advertising cology and Pro Publicatior Learning d Simulat inputationa pring Inte	ng Varian Detection ng Skewe  Modellin  ustry – D n – Aeros I Environ  actical F n, 2016. with Mic  ion", Spi al Thinki rnationa for Data	ata Servipace and ment – E  Periods:  Universite of the propertion of the properties	pability – Probracterizing Districtions  Periods: 09 - Data Visual  Periods: 09 ces – Data S I Astronomy - commerce ar  ty Press, 20  xcel", Packt  ternational I  rld Scientification, 2017. e", Spring In	pability Disistribution hms: Logaristribution hms: Logaristribution To ization To ization To ization To ization Total  Total  Publicat  Publishin  Publishin  Publishin	s. arithms and ols – Tools ols – Tools oplication: reative - Education  Periods: 4  ion, 2019. g, 2 <sup>nd</sup> Edition ng, 2017. all Publicat	co co st5

International Publication, 2018.

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#### COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												ram Spe omes (P		
12 1	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	2	2	1	1		en en	And the same					2	2	2
2	3	3	3	3	3	-	A PORT	19m	-	Sel Terrary	- L-1		3	3	3
3	3	3	3	3	3		15200	) # 2h	11-2	er EIS	1 -	F _ #	3	3	3
4	2	2	2	2	3		-	-				-	2	2	2
5	3	2	2	2	2	-		-	-15		-	-	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

	- 1944 S	Conf	inuous Assess	ment Marks (CA	M)	End	1ET	
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Semester Examination (ESE) Marks	Total Marks	
Marks	5	5	5	5	5	75	100	

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Semester	Englis			me: B.T	and the later and the same	Charles Search	Parthur.			
Selliesiel	1 5		Course (	Category	: HS	End	Semeste	r Exam Ty	oe: TE	
Course Code	U23EI	NBC01	Pe	riods/W	eek	Credit	N	/laximum N	1arks	
			Say Tabalande	L sul T	P	С	CAM	ESE	TM	
Course Name	Comn	nunicative English - I	2		2	3	50	50	100	
		(Common to A	LL Branches	except	CSBS)		11-3-1		<del></del>	
Prerequisite	Basic	s of English Language	San Sand Sta	No Live		handa tarahin	sie Ha G	94000		
TOURS AND MADE		npletion of the course, the stu	idents will be	able to				BT Ma	ppina	
	Dett							(Highest		
Course	CO1	Understand the communication	flow in organi	zation a	nd its ob	jectives		K	2	
Outcomes	CO2	Write the technical contents wit	th grammatica	ly precis	e senter	nces		K	2	
	CO3	Articulate with correct pronunci	ation and over	come ve	ernaculai	impact in s	speaking	g K3		
	CO4		K2							
	CO5		K2							
UNIT-1		tead Communication			Р	eriods:10		- 1 W 4		
Communication,	Definition	n, Process, Channels, Barriers,	Strategies for	Effectiv	e Comn	nunication, V	erbal and	Nonverba	CO	
		g, Types, Barriers, Enhancing Lister					ternet Refe	erences		
UNIT- II	1	on Errors in Writing and Com	27			eriods:10				
Subject Verb Agre Fragment - Reac Prediction, and C	ding Con	Misplaced Modifiers, Squinting Mod nprehension: Technical passage, S I Meaning	difiers, Dangling Strategies: Skin	Modifier, iming, So	Fused S canning,	entence, Co Intensive an	mma Splic id Extensi	e, Sentence ve Reading	CO	
UNIT- III	Phone		ASTONIA LIS	Partema.	P	eriods:10			<u> </u>	
Pronunciation Gu	uidelines	to consonants and vowels, Sound	s Mispronounce	d, Silent	and Non	-silent Letter	rs, Intonat	ion, Spelling	CO	
Rules and Words	often mi	sspelled, Mother Tongue Influence	(MTI), Various 7	echnique	es for Neu	utralization of	f Mother T	ongue		
_istening: Self In Speaking: Self-In	s ntroduction ntroduction	on, Extempore, and Role Play			P	eriods:15			CO	
ist of Exercises Listening: Self In Speaking: Self-In Reading: Non-Te Vriting: Common	s ntroduction ntroduction echnical ( n Errors	on videos on, Extempore, and Role Play Comprehension Passage on Writing							CO	
List of Exercises Listening: Self In Speaking: Self-In Reading: Non-Te Writing: Common	ntroduction ntroduction echnical ( n Errors	on videos on, Extempore, and Role Play Comprehension Passage				eriods:15 Periods:15			CO4	
List of Exercises Listening: Self In Speaking: Self-In Reading: Non-Te Writing: Common UNIT-V List of Exercises Listening: Speed Speaking: Debat Reading: Common Writing: Transcri	Introduction Errors Interpes Ch Sound E, Struct Conly Confection	on videos on, Extempore, and Role Play Comprehension Passage on Writing ersonal Communication-I es, Interview Videos ured Group Discussion, and Convertused Words				Periods:15		8.1	CO	
List of Exercises Listening: Self In Speaking: Self-In Reading: Non-Te Writing: Common UNIT-V List of Exercises Listening: Speed Speaking: Debat Reading: Common Writing: Transcrip L'ecture Period	Introduction Errors Interpes Ch Sound E, Struct Conly Confection	on videos on, Extempore, and Role Play Comprehension Passage in Writing ersonal Communication-I s, Interview Videos ured Group Discussion, and Conve	rsation   Practica	I Period		Periods:15	tal Perioc	ds: 60		
List of Exercises Listening: Self In Speaking: Self-In Reading: Non-Te Writing: Common UNIT-V List of Exercises Listening: Speece Speaking: Debate Reading: Common Writing: Transcrip Lecture Perioc	Interpose Structionly Conjustion	on videos on, Extempore, and Role Play Comprehension Passage in Writing ersonal Communication-I s, Interview Videos ured Group Discussion, and Convertiused Words  Tutorial Periods:	Practica		s: 30	Periods:15			COS	
List of Exercises Listening: Self In Speaking: Self-In Reading: Non-Te Writing: Common UNIT-V List of Exercises Listening: Speece Speaking: Debate Reading: Common Writing: Transcrip Lecture Period Text Books  1. Richa M Private L 2. Rizvi M. Edition, 2	Interpesch Sounder, Structionly Comption  Iishra, F.  Ashraf, 2010.	on videos on, Extempore, and Role Play Comprehension Passage in Writing ersonal Communication-I  s, Interview Videos ured Group Discussion, and Convertised Words  Tutorial Periods:  RatnaRao, "A textbook of Engrised Edition 2021. "Effective Technical Communication-I	Practica lish Language ation", New De	Comm	s: 30 unicatio	Periods:15  To:  Skills", M	Macmillan	Publisher	CO:	
List of Exercises Listening: Self In Speaking: Self-In Reading: Non-Te Writing: Common UNIT-V List of Exercises Listening: Speed Speaking: Debat Reading: Common Writing: Transcri Lecture Period Fext Books  1. Richa M Private L 2. Rizvi M. Edition, 2 3. Balasubr	Interpesch Sounder, Structionly Confection dis: 30  Iishra , Fatta, Revaluation Ashraf, 2010.	on videos on, Extempore, and Role Play Comprehension Passage in Writing ersonal Communication-I  s, Interview Videos ured Group Discussion, and Convertiused Words  Tutorial Periods:  RatnaRao, "A textbook of Engrised Edition 2021.	Practica lish Language ation", New De	Comm	s: 30 unicatio	Periods:15  To:  Skills", M	Macmillan	Publisher	CO:	
List of Exercises Listening: Self Interest Speaking: Self-Interest Self-Interest Speaking: Common UNIT-V List of Exercises Listening: Speaking: Debate Speaking: Common Uniting: Transcript Lecture Period Fext Books  1. Richa Marivate Language Lang	Interpose Struct only Conjustion dis: 30  Iishra , F. Ltd., Rev. Ashraf, 2010.  ramania Meenal Jniversit	on videos on, Extempore, and Role Play Comprehension Passage in Writing ersonal Communication-I  s, Interview Videos ured Group Discussion, and Convertiused Words  Tutorial Periods:  RatnaRao, "A textbook of Engrised Edition 2021. "Effective Technical Communication T, "English Phonetics for India a, C. Savitha," English for Engireshi, and Sharma, Sangeetha, by Press, 2017.	Practical lish Language ation", New Dean students wo neers", Cambri "Technical C	Commelhi: Tata rkbook", dge Univ	s: 30 unication a-McGrav 2 <sup>nd</sup> Edit versity P cation -	To:  Skills", Market Ma	Macmillan shing Cor Press, 20 and Prac	Publisher mpany Lim 16. etice", 3 <sup>rd</sup>	s Indited, 4	
List of Exercises Listening: Self In Speaking: Self-In Reading: Non-Te Writing: Common UNIT-V List of Exercises Listening: Speece Speaking: Debate Reading: Common Writing: Transcrip Lecture Period Text Books  1. Richa M Private L 2. Rizvi M. Edition, 2 3. Balasubr Reference Boo  1. N.P.Sudi 2. Raman, Oxford U 3. Comfort, Universit	Interpesch Sound Struct Conference of Sound Struct Conference of Struct	on videos on, Extempore, and Role Play Comprehension Passage in Writing ersonal Communication-I  s, Interview Videos ured Group Discussion, and Convertiused Words  Tutorial Periods:  RatnaRao, "A textbook of Engrised Edition 2021. "Effective Technical Communication T, "English Phonetics for India a, C. Savitha," English for Engireshi, and Sharma, Sangeetha,	Practical lish Language ation", New Dean students wo meers", Cambri "Technical Company Developing	e Comm elhi: Tata rkbook", dge Univ ommunio Speakin	s: 30 unication a-McGrav 2nd Edit versity P cation -	To:  Skills", Market Ma	Macmillan Shing Cor Press, 20 and Prace	Publisher mpany Lim 16. etice", 3 <sup>rd</sup>	s Indited, 4	

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COs/POs/PSOs Mapping

COs		Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	P01	PO2	PO3	P04	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
1	1	14 <u>-</u> - *	41-	Phy.	1	-		: - i.,		3	9-4 <b>-1</b> 11	1	King Egy	1 1 1 1 1 1	ESHECT:	
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3	1	10 F	124.1		-	-,	ē - 14	12 - L.	p 1	3	1 1.	1		-	-	
4	1		10	1 = 1	-	-		1.5	=	3	-	1	74-	-	-	
5	1	-	2 (2.1)	LUT	-	-	-	-	1	3	Tour	1	201	- 4	ade p	

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

				Theory	r <sub>i</sub> = r <sub>k</sub> · · · · · · · · ·	9 ts c.rae ()
	Conti	inuous A	ssessment Ma	rks (CAM)	- Party I	The Little
Assessment	CAT 1	CAT 2	Model Exam	Attendance	End Semester Examination (ESE) Marks	Total Marks
Marks	5	5	5	5	75	60
	2	0( to be w	eighted for 10 r	narks)	(to be weighted for 50 marks)	2000

	1 - 122							
Continuous Assessm Evaluation	ent Internal	End Semester In	ternal Evaluation	Total Marks				
30(to be weight	ed for 10 marks)	30 m	30 marks					
Listening (L)*	10	Listening (L)*	10	1 T N 128				
-Speaking(S)	5	Speaking(S)	5	40				
Reading(R)*	10	Reading(R)*	10	and the same of th				
Writing(W)*	5	Writing(W)*	5	7 18.5				

• LRW components of Practical can be evaluated through Language Lab Software

Computer Science and Engineering	Progran	nme: B	Tech.	The electrical		disa rayeta e	, i reshe.			
И	Course	Catego	ry: ES	End Ser	nester Exa	am Type	: LE			
U22CSPC01	Pe	eriods /	Week	Credit	Credit M		aximum Marks			
UZSCSFCUT	L	T	Р	С	CAM .	ESE	TM			
Programming in C Laboratory	0	0	2	176	50	50	100			
(Common	to All Bra	anches)	7.		<u> </u>					
NIL	A. O. A	v 25 il	The second	111						
On completion of the course, the studen	ts will be	able t	0				apping st Level			
CO1 Implement logical formulations to so applications.	С	K3								
CO3 Experiment C programs involving fu	nctions, r	ecursio	n, pointe	ers, and struc	tures.	ŀ	(3			
CO4 Demonstrate applications using seq	uential ar	nd rand	om acce	ss file proces	sing.	P	(3			
CO5 Build solutions for online coding cha	llenges.	A grant	ggreen Te			P	(3			
ses						<u> </u>				
	I/II  U23CSPC01  Programming in C Laboratory  (Common NIL  On completion of the course, the student applications.  C01 Implement logical formulations to so applications.  C02 Execute C programs for simple applications.  C03 Experiment C programs involving furus applications using sequence C05 Build solutions for online coding characteristics.	I/II Course  U23CSPC01 Programming in C Laboratory 0  (Common to All Branch NIL  On completion of the course, the students will be applications.  CO1 Implement logical formulations to solve simple applications.  CO2 Execute C programs for simple applications or and strings.  CO3 Experiment C programs involving functions, or CO4 Demonstrate applications using sequential arco5 Build solutions for online coding challenges.	U23CSPC01  Programming in C Laboratory  (Common to All Branches)  NIL  On completion of the course, the students will be able to applications.  CO2 Execute C programs for simple applications making and strings.  CO3 Experiment C programs involving functions, recursion CO4 Demonstrate applications using sequential and rand CO5 Build solutions for online coding challenges.	I/II   Course Category: ES	U23CSPC01	U23CSPC01	U23CSPC01  Periods / Week Credit Maximum  L T P C CAM ESE  Programming in C Laboratory 0 0 0 2 1 50 50  (Common to All Branches)  NIL  On completion of the course, the students will be able to  CO1 Implement logical formulations to solve simple problems leading to specific applications.  CO2 Execute C programs for simple applications making use of basic constructs, arrays and strings.  CO3 Experiment C programs involving functions, recursion, pointers, and structures.  CO4 Demonstrate applications using sequential and random access file processing.			

Write a C program to find the Area of the triangle.

2. Develop a C program to read a three digit number and produce output like

1 hundreds

7 tens

2 units

For an input of 172.

- B. Write a C program to check whether a given character is vowel or not using Switch Case statement.
- 4. Write a C program to Print the numbers from 1 to 10 along with their squares.
- 5. Demonstrate do—While loop in C to find the sum of 'n' numbers.

6. Find the factorial of a given number using Functions in C.

7. Write a C program to check whether a given string is palindrome or not?

8. Write a C program to check whether a value is prime or not?

- 9. Develop a C program to swap two numbers using call by value and call by reference.
- 10. Construct a C program to find the smallest and largest element in an array.

11. Implement matrix multiplication using C program.

- 12. Write a C program to perform various string handling functions like strlen, strcpy, strcat, strcmp.
- 13. Develop a C program to remove all characters in a string except alphabets.

14. Write a C program to find the sum of an integer array using pointers.

- 15. Write a C program to find the Maximum element in an integer array using pointers.
- 16. Construct a C program to display Employee details using Structures
- 17. Write a C program to display the contents of a file on the monitor screen.
- 18. Write a File by getting the input from the keyboard and retrieve the contents of the file using file operation commands.
- 19. Write a C program to create two files with a set of values. Merge the two file contents to form a single file

20. Write a C program to pass the parameter using command line arguments.

Lecture Periods: Tutorial Periods: Practical Periods: 30 Total Periods: 30

#### Reference Books

- Zed A Shaw, "Learn C the Hard Way: Practical Exercises on the Computational Subjects You Keep Avoiding (Like C)", Addison Wesley, 2016.
- 2. Anita Goel and Ajay Mittal, "Computer Fundamentals and programming in C", Pearson Education, 1st edition, 2011.
- 3. Maureen Sprankle, Jim Hubbard," Problem Solving and Programming Concepts," Pearson, 9<sup>th</sup> Edition, 2011.
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#### COs/POs/PSOs Mapping

COs		Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
TY-1	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
1	2	1		행4. 정	3		(5inj.	5-6		30. <u>4</u> 6.5	C		3	472,7	3	
2	2	1		1 - 3	3		3 - 1	- <u>-</u> .	/ <b>-</b> 793	0.47			3		3	
3	3	2	1	1	3	1 7	3 - ]	-		-			3	- //	3	
4	3	2	1	1	3	-1	\$ <del>-</del> 1				- 1000	1- 30 - F 30 .	3		3	
5	3	2	1	1	3	+ 2 /				- 19.4 <u>2</u> 7.5	49 <u>25</u> 2	Regulation	3		3	

Correlation Level: 1 - Low, 2 - Medium, 3 - High

	C	ontinuous	Assessn	nent Marks (CAM	1)			
Assessment	Performance in	n practical o	classes	Model		End Semester	Total	
A Social Ment	Conduction of practical	Record work	viva	Practical Examination	Attendance	Examination (ESE) Marks	Marks	
Marks	15	5	5	15	10	50	100	

Mechanical Engineering	Programme: B.Tech.										
	Course C	Category	: ES	End 9	End Semester Exam Type: LE						
U23ESPC03	Per	riods / W	/eek	Credit		Maximum	Marks				
	L	T	Р	С	CAM	ESE	TM				
Engineering Graphics using AutoCAD	0	0	2	1	50	50	100				
The second of the Second Secon	U23ESPC03	I Course C U23ESPC03 Per L	Course Category	Course Category: ES	Course Category: ES	Course Category: ES	Course Category: ES				

Prerequisite		
	On completion of the course, the students will be able to	BT Mapping (Highest Level)
Course	CO1 Familiarize with the fundamentals and standards of engineering graphics.	K2
Outcomes	CO2 Perform drawing of basic geometrical constructions and multiple views of objects.	K2
	CO3 Visualize the isometric and perspective sections of simple solids.	K3
	CO4 Connect side view associate on front view.	K4
	CO5 Correlate sectional views and lateral surface developments of various solids.	K4

#### List of Experiments

- Study of capabilities of software for Drafting and Modeling Coordinate systems (absolute, relative, polar, etc.) Creation of simple figures like polygon and general multi-line figures.
- Drawing a Title Block with necessary text and projection symbol.
- Drawing 2D sketch by applying modify tools like fillet, mirror, array, etc.,
- Drawing front view and top view of simple solids like prism, pyramid, cylinder, cone, etc., and Dimensioning.
- Drawing front view, top view and side view of objects from the given pictorial views (eg. Simple stool, V-block, Mixie
- Drawing a plan of residential building (Two bed rooms, kitchen, hall, etc.)
- Drawing sectional views of prism, pyramid, cylinder, cone, etc.
- Drawing lateral surface development of prism, pyramid, cylinder, cone, etc.
- Drawing isometric projection of simple objects.
- 10. Creating 3D model of simple object and obtaining 2D multi-view drawings.
- 11. Note: Plotting of drawings must be made for each exercise and attached to the records written by Students.

Lecture Periods:	Tutorial Periods:	Practical Periods: 30	Total Periods: 30
Reference Books			

- James D. Bethune, Engineering Graphics with AutoCAD A Spectrum book 1st edition, Macromedia Press, Pearson, 2020.
- NS Parthasarathy and Vela Murali, Engineering Drawing, Oxford university press, 2015.
- M.B Shah, Engineering Graphics, ITL Education Solutions Limited, Pearson Education Publication, 2011.
- Bhatt N.D and Panchal V.M, Engineering Drawing: Plane and Solid Geometry, Charotar Publishing House, 2017.
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- http://www.nptelvideos.in/2012/12/computer-aided-design.html
- https://mech.iitm.ac.in/meiitm/course/cad-in-manufacturing/
- https://autocadtutorials.com
- https://dwgmodels.com

COs Program Outcomes (POs)											Program Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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Correlation Level: 1 - Low, 2 - Medium, 3 - High

	Co	ntinuous /	Assessr	ment Marks (CAN	<b>(1)</b>		8. T. T.
Assessment	Performanc clas	e in practions	cal	Model		End Semester	Total
	Conduction of practical	Record work	viva	Practical Examination	Attendance	Examination (ESE) Marks	Marks
Marks	15	5	5	15	10	50	100

Department	Artificial Intelligence and Data Science	Progra	amme: <b>E</b>	3.Tech.	1250 - s			
Semester	Less comparable en series de la comparable de la	Cours	e Categ	ory: PC	End	Semeste	Exam Ty	oe: LE
Course Code	U20ADP101	Р	eriods /	Week	Credit	Credit Maximum Ma		
	deliko perindik temperan	e e La	and Tal	P.	С	CAM	ESE	TM
Course Name	Fundamental Of Data Science Laboratory	0	0	2	1	25	75	100

Prerequisite	NIL 1993 - Salaspond 1 12 diesen van 1 de eeu 1 de eeu 2015 - 2015	
	On completion of the course, the students will be able to	BT Mapping (Highest Level)
Course	CO1 Describe common Excel functionality and features used for data science.	K2
Outcomes	CO2 Analyze and construct the Data Visualization.	K2
	CO3 Configure the programming environment.	K3
	CO4 Analyze real time data set.	K3
	CO5 Implement Pivot tables and VLOOKUP functions.	K3

#### List of Exercises

- Study of basic Function in Excel.
- 2. Working with Range Names and Tables.
- 3. Cleaning Data with Text Functions.
- 4. Cleaning data containing Data Values.
- 5. Working with VLOOKUP functions.
- 6. Demonstration of Data Visualization.
- 7. Importing Data from external source into Excel.
- 8. Creating a Data Model.
- 9. Exploring Data with PivotTables and Charts.
- 10. Create a Dash board for a given requirement.

11. Implement a data a	analytics for the real time data set.			
Lecture Periods:	Tutorial Periods:	Practical Periods: 30	Total Periods: 30	
Reference Books				

- 1. Julio Cesar Rodriguez Martino, "Hands-on Machine Learning with Microsoft Excel", Packt Publication, 2019.
- 2. Paul McFedries, "Excel Data Analysis for Dummies", John Wiley and Sons, 2019.
- Gordon S. Linoff, "Data Analysis Using SQL and Excel", Wiley Publishing, 2008.
- 4. Hector Guerrero, "Excel Data Analysis: Modeling and Simulation", Springer International Publishing, 2nd Edition, 2019.
- Steven S. Skiena, "Data Science Design Manual", Spring International Publication, 2017.

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- https://www.coursera.org/learn/excel-data-analysis
- https://www.edx.org/course/introduction-to-data-analysis-using-excel-2
- https://www.kaggle.com/datasets
- https://www.tutorialspoint.com/excel data analysis/index.htm

COs/POs/PSOs Mapping

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5	3	2	3	2	2	-	-	-	-	-	-	-	3	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

	Co	ntinuous A	ssess	ment Marks (CA	AM)		
Assessment	Performand cla	ce in pract isses	ical	Model		End Semester Examination	Total
Altendanc	Conduction of practical	Record work	viva	Practical Examination	Attendance	(ESE) Marks	Marks
Marks	15	5	5	15	10	50	100

Department	Artificial Intelligence and Data Science	Programn	ne: B.T	ech.	41 - 22 - 24 - 24 - 24 - 24 - 24 - 24 -			
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Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM, Texas Instruments, Bentley, Autodesk, Eplan and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence.

Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

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- Seely, John," Oxford A-Z of Grammar and Punctuation, Oxford Publication, 2013.
- B.V. Ramana," Higher Engineering Mathematics", Tata McGraw Hill, New Delhi, 6<sup>th</sup> Edition, 2018. Dr. A. Singaravelu, "Engineering Mathematics I", Meenakshi publications, Tamil Nadu, 2019. E. Balagurusamy, "PROGRAMMING IN ANSI C", Mc Graw Hill, 8<sup>th</sup> Edition, 2019.

- Dr.K.K.Pillay, "Social Life of Tamils", A joint publication of TNTB & ESC and RMRL
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- https://www.aplustopper.com/formal-letter/
- https://www.javatpoint.com/c-programming-language-tutorial
- http://www.math.cum.edu/~wn0g/2ch6a.pdf
- https://education.nsw.gov.au/teaching-and-learning/curriculum/creative-arts

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Correlation Level: 1 - Low, 2 - Medium, 3 - High

	T Tales T	Conti	nuous Ass	essment Marks	(CAM)	End	
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Semester Examination (ESE) Marks	Total Marks
Marks	5	- 5	5	5	5	75	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Course Name  Prerequisite	U23BST0	C01 Science for Engineers	Course (Pe	riods/W	S 80 000 1	Credit C	d Semester Ma	Exam Typ aximum Ma ESE	irks
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Erancia. Prerequisite	Physical	Science for Engineers	L		P	С	CAM	FSF	
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			non to all Bra		- 7				R-12-1
will be made to		of 12 <sup>th</sup> standard or equivalent				or equival	lent.	Light.	5.5
	On com	pletion of the course, the stu	udents will be	e able to	)			BT Ma	
	CO1	Inderstand the basic of prope	rties of magne	etic diele	ectric a	nd superc	onductors	(Highest	
		dentify the wave nature of the		Dr 1547 E.				K	
Course		Understand the basic principle			A 100 CO			K	
Outcomes		Understand and familiar with the							
								K	
		Understand the electrode pote and uses of various batteries.	ntial for its fea	asibility II	n electr	ocnemica	reaction	K	2
	}	Inderstand the specific operat	ting condition	under w	hich co	rrosion oc	curs and	K	2
m sedu   1,021		suggest a method to control co							
			ION A - PHYS		•				
UNIT-I		c. Dielectric, and Supercond				Periods: 8			
materials-ferrites-D	Dielectric r	aterials, Ferromagnetism- Doma naterials-Types of polarization lectric materials-Superconducting	<ul> <li>Langevin-De</li> </ul>	ebye equ	uation-Fi				cc
UNIT-II	Quantun	n Mechanics				Periods:	7		
		Wavelength - Uncertainty Princip						linger wave	CC
Equation - Time D	ependent -	- Time Independent - Application	to Particle in a	One Dim	ensiona	Box - Tun	nel Diode.		
UNIT-III	Laser an	d Fiber Optics				Periods:	7		
Action -compone	nts of lase	<ul> <li>Spontaneous and Stimulated Entry Types of Lasers - NdYAG, Cotal aperture and acceptance angle</li> </ul>	O2 laser, GaAs	Laser F	iber Op	tics - Princ	iple and Pro	pagation of	co
rational literature (March 1984)	***************************************	SECTIO	N B - CHEM	ISTRY					4
	8 8 8 8 8 8 8 8	d its Treatment				Periods:			
nardness, alkalini nard water in boil	ity, TDS, ler - Treatr External tre	rities, Water quality parameter COD and BOD. Desalination ment of boiler feed water: Internated eatment-lon exchange deminerali	of brackish v al treatment (p ization and zeo	water: R hosphate	everse e, colloid	osmosis-d	isadvantages	s of using	CC
UNIT-V		hemical Cells and Storage D				Periods:			
measurement. Ne	rnst equati	trode potential, standard electron. Electrolyte concentration celloteries- alkaline battery-lead stora	l. Reference ele	ectrodes-	hydroge	n, calomel	and Ag/AgC	I. Batteries	CC
	Corrosio					Periods:			
- material selectio	n and desi inhibitors,	tors – types – chemical, electroch gn aspects – electrochemical pro metallic coating – anodic coating	otection - sacrif	ficial anod	de meth	od and imp	pressed curre	ent cathodic	CC
Lecture Period		Tutorial Periods:	Practica	l Period	ls:		Total Perio	ds: 45	_ <u> </u>
Text Books			- E				)		
1.0 V Rajen	dran, "Enç a – "A tex	gineering Physics", 2 <sup>nd</sup> Edition, book of Engineering Chemist in, —"Engineering Chemistryll	try" - 15 <sup>th</sup> Editi	on, 2021	1. S.Ch	and Public	cations.		

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- https://mechanicalc.com/reference/engineering-materials 4.
- http://ndl.ethernet.edu.et/bitstream/123456789/89589/1/%5BPerez N.%5D Electrochemistry and corrosion%28 BookZZ.org%29.pdf

## COs/POs/PSOs Mapping

COs				g=133	Prog	ram O	utcom	es (PO	s)	a Mili	i igo -	et - X ii. S		ram Spe omes (P	
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5	3.	. 1	-	-	-	-	-	-	-	-	-	-	-	-	-

Correlation Level: 1 - Low, 2 - Medium, 3 - High

		Contin	uous As	sessment Mark	s (CAM)	End	
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Semester Examination (ESE) Marks	Total Marks
Marks	5	5	5	- 5	5	75	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

	11		Course C	ategory	: ES	En	d Semestei	r Exam Typ	e: TE
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Course Name	Programming	in Python	3	0	0	3	25	75	100
	4	(Con	nmon to All Brar	ches)			<u> </u>		
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T rerequione	T CALL RESTAR STORY	of the course, the s	tudents will be	able to				BT Ma	nnina
	On completion	of the course, the s	tudents will be	able to				(Highest	
Course	CO1 Interpret	the basic concepts of	f Python progran	ns.	1 1769	£ 5 km Sm	itia te i K	K	
Outcomes	CO2 Articulate	e the concepts of Sets	s, Dictionaries ar	nd Object	t-Orien	ted conce	pts.	K	2
		ent with Numpy packa						K	
		d analyze Data Manig		dae		1342, St. L2	S GV-E-T (Y)	K	
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		programming concep	ot for visualizatio	n with iv				K	3 
UNIT-I	Introduction to		Tarki toni			Periods: (			·
Structure of Pyth Branches and Lo	on Program – Uno	derlying mechanism of I Lambda Functions – Lis	Module Execution ts and Mutability -	<ul><li>Branc</li><li>Problem</li></ul>	hing and	Looping -	- Problem S	ions Using	CO
	•					v 1991,		10115.	<u> </u>
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	pping and Sets – L ssions using "re" m	Dictionaries. Classes: Classes	asses and Instanc	es – Inhe	ritance -	<ul><li>– Exceptior</li></ul>	n Handling –	introduction	CO
o Negulai Expres	ssions using te in	lodule.							
UNIT-III	Using Numpy				F	Periods: (	)9		
Basics of NumPv	- Computation on	NumPy - Aggregations	- Computation or	Arrays -	- Compa	arisons – M	lasks and Bo	oolean	T
		Arrays - Structured Data						100000	СО
UNIT-IV	Data Manipula	tion with Pandas	Internation		F	Periods: (	)9		
		ata indexing and Selection							CO
		Data Sets. Aggregation a		vot Table	s –Vecto	orized Strin	ng Operation	s – Working	
with Time Series	- High Performand	ce Pandas – eval() and o	query().						
LIMITA	Visualization V	With Matplotlib			T F	Periods: (	)9		<u> </u>
UNII-V								nd Density -	СО
UNIT-V Basic functions of		•	ot - Density and C	ontour P	lots - Hi	stoarams -			
Basic functions o	f Matplotlib – Simp	le Line Plot – Scatter Plo Bars – Three-Dimension			lots – Hi	stograms -	3	,	00
Basic functions o	f Matplotlib – Simp	le Line Plot – Scatter Plo Bars – Three-Dimension	nal Plotting in Mat	olotlib.				•	
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Basic functions of Customizing Plot  Lecture Period  Text Books  1. Jake Va 2016. 2. Zhang. 3. Wesley  Reference Boot 1. John Pa 2. Jesus F 3. Brian D Prograr 4. Mark Lu 5. Gowrisl	f Matplotlib – Simp Legends – Colour ds: 45 anderPlas, "Pythory, "An Introduction J Chun, "Core Poks aul Mueller, Luca Rogel-Salazar, "Draper, "Python Forming Language utz, Laura Lewin, hankar S, Veena	le Line Plot – Scatter Plot Bars – Three-Dimension  Tutorial Periods:  On Data Science Hand  on to Python and Compython Programming",  Massaron, "Python for Data Science and Ana Programming A Compy", CreateSpace Indep	Practical  Dractical  Dractical	Period I Tools faing", Spation, 2nd for Dumn", CRC eginnering Platfo	s:  for Work  fringer F  Edition,  mies", 2  Press s to Ma  form, 20°  lly Med	ving with In Publication, 2006.  2 <sup>nd</sup> Edition Taylor and ster and 16. ia, 3 <sup>rd</sup> Edition Edition ia, 3 <sup>rd</sup> Edition ia, 3	Data", O'Rens, 2016.  n, John Wiled Francis Gebecome ar	ds: 45 eily Media I ey& Sons, 3	nc,
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Basic functions of Customizing Plot  Lecture Period  Text Books  1. Jake Var 2016. 2. Zhang. 3. Wesley  Reference Boo  1. John Par 2. Jesus Frogram 4. Mark Lur 5. Gowrisl  Web Reference 1. https://w	f Matplotlib – Simp Legends – Colour ds: 45  anderPlas, "Pythory, "An Introduction of J Chun, "Core Poks aul Mueller, Luca Rogel-Salazar, "Draper, "Python Forming Language utz, Laura Lewin, hankar S, Veena es potel.ac.in/course	le Line Plot – Scatter Plot Bars – Three-Dimension Tutorial Periods:  Tutorial Periods:  On Data Science Hand on to Python and Complython Programming, at Massaron, "Python for Data Science and Ana Programming A Complython Programming A Complython, "Program Willison, "Program Willison, "Program, Untroduction to Python to Python Program Willison, "Program	Practical  Practical  dbook - Essential  puter Programm  Pearson Educat  or Data Science lytics with Pytho blete Guide for Beendent Publishingramming Pythor  thon Programmi  2/  -visualization-pyt	olotlib.  I Period  I Tools f  ning", Sp  tion, 2 <sup>nd</sup> for Dum  n", CRC  eginner  ng Platfo  ", O'Rei  ng", CR	s:  for Work  fringer F  Edition,  mies", 2  Press s to Ma  form, 20°  lly Med	ving with In Publication, 2006.  2 <sup>nd</sup> Edition Taylor and ster and 16. ia, 3 <sup>rd</sup> Edition Edition ia, 3 <sup>rd</sup> Edition ia, 3	Data", O'Rens, 2016.  n, John Wiled Francis Gebecome ar	ds: 45 eily Media I ey& Sons, 3	nc,
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Artificial Intelligence and Data Science Programme: B.Tech

Department

5. https://www.programiz.com/python-programming

COs		, - N. *			Prog	ram O	utcom	es (PO	s)	456237		16.5485.21		ram Spe omes (P	
	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1			3	5	iku <del>-</del> A		-	; <b>-</b> ,:	- 1		3	11/F - S	3
2	2	2	1	3	(n) l=	. V-T			, i - <del>-</del> -			2	2	2	3
3	3	2	2	3		4 <del>-</del> . 1 .	-47-1	<u> </u>	. <del>.</del>	See to	يسته ده	2	3	2	3
4	3	3	2	3			TAE T	***		Maria L	1, X 1 * 1	3	3	3	3
5	3	3	2	3		g <del>:</del>		9 - J				2	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

		Cont	inuous Assess	ment Marks (CA	M)	End	
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Semester Examination (ESE) Marks	Total Marks
Marks	5	5	5	5	5	75	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	Compu	ter Scie	ence and Engineering	Progra	mme: B	.Tech.	n i i i i i i i i i i i i i i i i i i i			
Semester	11/111			Cours	e Catego	ory: PC	End	Semester	Exam Typ	e: <b>TE</b>
LE Mode AMbe	110000	Chili	Start Baltine Ass	Pe	riods / W	/eek	Credit	Ma	ximum Ma	rks
Course Code	U23CST	1003			r last T	∏ P	C	CAM	ESE	TM
Course Name	Data St	ructure	<b>s</b> 76	3	- J	2 4 <b>-</b> 125	3	25	75	100
m' Branklinsije			(Com	mon to all B	ranches)					
Prerequisite	Any Pro	grammi	ng Knowledge		3 (1) (1)		garies Arigin			TO THE
Course	On com	pletion	of the course, the stu	idents will	oe able t	o e raman		i valendi	BT Ma (Highe Level)	
Outcomes	CO1 C	compute	time and space compl	lexity for giv	en proble	ems			K	3
	1		rate stack, queue and i		······	A STATE OF THE STATE OF			K	
	·		the various operations					I I Barre	K	
			concepts of tree for var			n			K	
			he various Tables, Gra	A	s technic	ques.			K	.3
UNIT-I	<u> </u>		logies of Data Structure - Asymptotic Notations:				Periods: 9	231		<del></del>
Search and Bina Performance and	ary Search Comparis	n Techni on amor	ques. Sorting: Bubble S ig the sorting methods.				on Sort – He			
UNIT-II	.1		ue Operations				Periods: 9			
			d its operations. Applicat Simple Queue – Circular					evaluation.	ADT Queu	e CO2
UNIT-III	Linked	List Op	erations				Periods: 9	The state of the s		
			esentation in memory. Al tack and Queue. Doubly l						– Insertion	- cos
UNIT-IV	Trees		1. The second se				Periods: 9			
Trees: Basic Tree Traversals – AVL			ferent types of Trees: Bin ree.	ary Tree – Ti	readed E	Binary Tre	e – Binary Se	arch Tree -	- Binary Tre	e CO4
UNIT-V	Graphs	, Tables	and Sets				Periods: 9	***************************************		
			presentations – Graph tra epresentation of Sets- Op				ent types of to	ables – Ha	sh Table an	cos
Lecture Period	ds: 45		Tutorial Periods:	Practi	cal Perio	ods:	Tota	al Periods	s: 45	
Text Books								4.1		15,000
<ol> <li>Thomas</li> <li>3rd edit</li> <li>Alfred V</li> </ol>	s H. Core ion, 2010 /. Aho, Je	eman, C ).	hni," Fundamentals of I harles E. Leiserson, R Ullman, John E. Hopcr	tonald L. Ri	vest and	Clifford	Stein, "Intro	duction to	Algorithm	
Reference Boo										
<ol> <li>Robert</li> <li>2<sup>nd</sup> Edit</li> <li>Mark Al</li> </ol>	Kruse, C. ion, 2007 Ien Weiss	L. Tond s, "Data	ta Structures", Prentice o and Bruce Leung, "D Structures and Algorith rithms, Data Structures	ata Structur nm Analysis	es and P in C", Pe	rogram l earson E	Design in c", ducation, Se	cond. Edi	tion, 2006	
Publish 5. Mark A	ing Comp Illen Wei	oany, 19 ss," Alg								
Web Reference		atou Eul		Service Service	0 2	51 4 63				0.04115
1. https://v 2. https://v	www.geek	tpoint.co	eks.org/data-structures/ om/data-structure-tutori							

- 4. https://www.tutorialspoint.com/data\_structures\_algorithms/
- 5. https://www.w3schools.in/data-structures-tutorial/intro/

COs					Pro	gram	Outco	mes (P	Os)				Program Specific Outcomes (PSOs)		
	P01	PO2	PO3	P04	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	1	7.1-47	*[.( <b>-</b> )		2 - EV	10.5		a ja	for <del>-</del> in,	3	2	3
2	3	2	1	1	A _ A-		-	<u>-</u> '-			-	1	3	2	3
3	3	2	1	1		4.4.08	49-24	(-el <u>o</u> p)	mare an		5° 02[1] (	5-10 <u>-</u> 141	3	2	3
4	3	2	1	1	1 6772	01. EVE	n weeki	Nieta.	19. Dig	: - ( <del>-</del> - )	alt Teas	i g věgyř	3	2	3
5	3	2	1	1		1 - 2	· - u	diel-	- 15 - j	66-17	les <sub>or</sub> - <sub>Va</sub> '		3	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

	SET DI	Continu	ious Ass	essment Marks	(CAM)	End	Profession and Profes
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Semester Examination (ESE) Marks	Total Marks
Marks	1	0	5	5	5	75	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	Artificial Intelligence and Data Science	Programi			er, persona	a) rat band	enterpolitics.	rys it syet
Semester	Haraman princes and the second	Course C			PC End	d Semest	er Exam T	ype: <b>TE</b>
Course Code	U23ADT203	Per	iods / W	eek	Credit		Maximum	Marks
		L	$\mathbf{T}_{\mathbf{x}}$	P	С	CAM	ESE	TM
Course Name	Database Technologies 75 75 75	3	0	0	3	25	75	100
DERETT TWO	( <i>P</i>	AI &DS)	er han e dan	#07T#			Allery vale	
Prerequisite	NIL							
	On completion of the course, the studen	ts will be	able to				BT Ma (Highes	apping st Level
Course	CO1 Develop conceptual data model usir	ng Entity R	elations	hip Dia	gram		K	(2
Outcomes	CO2 Analyze and design Relational Data	base		· · · · · · · · · · · · · · · · · · ·			K	(3
	CO3 Understand and realize Transaction	and Conc	urrency	control	I I berteu	110,12160	K	(3
	CO4 Build Non-Relational Databases	n **					K	(3
	CO5 Understand and Analyze Emerging	Trends in o	database	e techn	ologies		K	(3
UNIT-I	Introduction		on A in		Periods: 09			
Database Design - The E-R Mode Schemas – Other	Application – Purpose of Database Systems – System Structure – Database Architecture. Database Architecture. Database – E-R Diagrams – E-R Destappects of Database Design	itabase Des ign Issues	ign and l –Extende	E-R Mod ed E-R	del: Overview features – F	of the De Reduction	sign Proces	ss
UNIT-II	Relational Database Management Syste Design	ms (RDBI	/IS) and		Periods: 09			
and Atomicity – S Control: Lock Bas Classification – R	agement: Transaction Concept – Storage Structu erializability – Recoverability – Transaction Isolat sed Protocols – Timestamp Based Protocols – Va emote Backup Systems.	tion Levels -	- Implem	entation cols. Re	of Isolation	Levels. Co em: Failure	ncurrency	COS
UNIT-IV	Non-relational databases (NOSQL) SQL databases: MongoDB-Cassandra- Redis-K	ov value etc	roo doo		Periods: 09			100
databases	OSQL databases. Mongobb-Cassandra- Nedis-N	ey-value sit	nes-docc	intent st	ores-columni	-iaiiliy Sio	res-graph	CO4
UNIT-V	Emerging Trends and Technologies				Periods: 09		7 - 15 A A	
	chnologies and trends- Blockchain databases-Tin s- Storing and Processing Time Series Data-Time			Time S	eries Data- A	New Wo	rld for Time	CO5
Lecture Period		Practica		s:	To	tal Perio	ds: 45	
Text Books	1	1. 1.4.0.104						
<ol> <li>Abraha</li> <li>Ted Du Educati</li> <li>Dan Su</li> </ol>	m Silberschatz, Henry F Korth, S Sudharsha nning and Ellen Friedman, "Time Series Dat on, 3 <sup>rd</sup> Edition, 2019. Ilivan," NoSQL for Mere Mortals", O'Rielly M	abases Ne	ew Ways	to Sto				n, 2021
Reference Boo							ofh —	
<ol> <li>Raghu</li> <li>G.K.Gu</li> <li>Jeffrey</li> <li>Imran B</li> </ol>	J, Kannan A, Swamynathan S, "An Introduct Ramakrishna, Johannes Gehrke, "Database pta, "Database Management Systems", Tata D. Ullman, "Principles of database systems" Bashir, "Mastering Blockchain: A deep dive in cryptocurrencies, Ethereum, and more", PA	Managem McGraw Compute nto distribu	nent Sys Hill, 201 r Scienc ted ledg	tems", 1. e Press ers, co	McGraw Hil s, 1982.	I, 3 <sup>rd</sup> Edit	ion, 2014.	
Web Reference			p., 196, 16.					
<ol> <li>https://de</li> <li>http://de</li> <li>http://w</li> </ol>	nptel.ac.in/courses/106/106/106106095/ docs.oracle.com/cd/E11882_01/server.112/eev.mysql.com/doc/ ww.rjspm.com/PDF/BCA-428%20Oracle.pdf www.tutorialspoint.com/dbms/index.htm		.htm My	SQL O	nline Docun	nentation		

COs	Program Outcomes (POs) Os												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	1	2	lug-Pag	contraction	1. AG - 1	34200		31 4 7	-	3	3	3
2	3	2	2	1	2		2,12:12					<del>degas</del>	3	3	3
3	3	3	3	3	3	tuli <u>s</u> av	5,045049	llyse, viii	AUUZE t	Heraren.	M.P. \$402	M. P <u>S</u> OCI	3	3	3
4	3	3	2	2	3	· - /		-	-				3	3	3
5	3	3	3	1	3		ii.	. 13-11		- 14-			3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

		Continu	ious Ass	essment Marks	(CAM)	End	
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Semester Examination (ESE) Marks	Total Marks
Marks	1	0	5	5	5	75	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	English	Programm					The Walk	및 Jung May
Semester		Course C	ategory	: HS	End	Semester	Exam T	ype: <b>TE</b>
Course Code	U23ENBC02	Pe	riods/We	eek	Credit	N	laximum	Marks
		TV L	T	Р	С	CAM	ESE	.TM
Course Name	Communicative English - IIWe	2		2	3	50	50	100
menes except	(Common to A	ALL Branches	except	CSBS)				F AL
Prerequisite	Basics of English Language		HILE					mali e
VICTORIAN EN	On completion of the course, the stu	idents will be a	able to		x 4 x 3		BT M	apping st Leve
Course	CO1 Draft effective written communic	cation in profess	sional er	nvironme	ent		, v	(2
Outcomes	CO2 Apply the mechanics of creative							(3
	CO3 Acquire language skills professensitizing various etiquettes in	ssionally to gr	oom the		-	ty throug	h k	(2
	CO4 Develop language fluency and g						T P	(3
	CO5 Express thoughts and ideas wit							(2
UNIT-I	Business Correspondence	a village ser is a serie			eriods:10			
	ng: Circular, Agenda, Memoranda, Notice, Ins	struction Minutes	Email V			- Official a	nd Dami	
Official Letters Letter to the Ed	: Applying for Educational / Car / Home Loar ditor, Calling for a quotation, Placing Order, L ter, Bio-data, CV	ns / Joining Repor	rt, Leave	Letter, Ir	dustrial Visit	, In plant Ti	raining,	CO.
UNIT-II	Functional Writing Skills			F	eriods:10			
	Writing, Sentence Structure, Art of condens inciples of paragraph writing, Techniques of						nd clause	СО
UNIT-III	Etiquettes			F	eriods:10		- to the second	
Dining Etiquette	ning, Kinds: Corporate Etiquette, Meeting Et	tiquette, Telephor	ne Etique			Social Med	ia Etiquett	e, CO
UNIT-IV List of Exerci	Communication Practice-II			<u> </u> F	eriods:15			
Listening: Le Speaking: Ju Reading: Va Writing: Diffe	etter writing tips ast a Minute, Impromptu Speech, Contempor ariety of examples for Modes of Writing arent types of letters	ary Issues						CO
UNIT-V	Interpersonal Communication-II			F	eriods:15			
Speaking: Te Reading: P	ises deos on different types of Etiquettes eam Presentation, Negotiation Skills hrases and Clauses e writing on any given topic, Paraphrasing Pra	actice						CO
Lecture Period	ds: 30 Tutorial Periods:	Practical	Period	s: 30	To	tal Period	ls: 60	
-ecture Perior		1. 14011041			1.0			
			· Now C	entral B	ook Agency	, 2020		
ext Books  1. PC Das 2. Kumar, 3. Raman	s, "Letter Writing including Official and Br Sanjay, Pushpalatha," Communication , Meenakshi&Sangeetha Sharma," Com oks	Skills". Oxford U	Jniversit	y Press,	2018.	/, 2020. 		
ext Books  1. PC Das 2. Kumar, 3. Raman Reference Book	Sanjay, Pushpalatha," Communication , Meenakshi&Sangeetha Sharma," Com oks	Skills". Oxford L munication Skil	Jniversit Is", New	y Press, Delhi: (	2018. DUP, 2018.	_	er New F	)elhi: 1
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ext Books  1. PC Das 2. Kumar, 3. Raman Reference Boo 1. Sahuka Edition 2. Gerson Edition,	Sanjay, Pushpalatha," Communication of the Meenakshi&Sangeetha Sharma," Comboks  ar, Nimeran , Bhalla, Prem,, "The book 2009.  Sharon J, Steven M. Gerson, "Technical of the Steven of t	Skills". Oxford Umunication Skillor of Etiquettes a	Jniversit Is", New and Mar ocess a	y Press, Delhi: (	2018. DUP, 2018. ustakMahal luct", Pears	Publishe		

- https://www.indeed.com/career-advice/finding-a-job/how-to-write-an-application-letter
- https://owlcation.com/humanities/Four-Types-of-Writing
- https://targetstudy.com/languages/english/paragraph-writing.html https://www.businessnewsdaily.com/8262-email-etiquette-tips.html
- https://www.youtube.com/watch?v=UOceysteljo

## COs/POs/PSOs Mapping

COs		Program Outcomes (POs)												Program Specific Outcomes (PSOs)				
	PO1	P02	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3			
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5	1	-	-	-	-	1 53-5	g - j - 1	-	1 - 5	3	T 27 T - 1 V	- 1	-	- 1	r n'es			

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

			Th	eory		
-	Contir	nuous Asse	ssment Mai	rks (CAM)	End Compater	
Assessment	CAT 1	CAT 2	Model Exam	Attendance	End Semester Examination (ESE) Marks	Total Marks
	5	5	5	5	75	77.4
Marks	20	( to be weig	hted for 10 n	narks)	(to be weighted for 50 marks)	60

Action Sci. Water a see	v 18012 2 44 21 2 55, v	Practical	A or or a court of section is	1 (mak para)
Continuous Assessme Evaluation	ent Internal	End Semeste	r Internal Evaluation	Total Marks
30(to be weighte	ed for 10 marks)	3	30 marks	
Listening (L)*	10	Listening (L)* -	. 10	7.
Speaking(S)	5	Speaking(S)	5	40
Reading(R)*	10	Reading(R)*	10	No. 1 (1)
Writing(W)*	5	Writing(W)*	5	20 1

LRW components of Practical can be evaluated through Language Lab Software

Department	Mecha	anical Engineering	Progra	amme: E	Tech.				give J.
Semester	1/11		Cours	e Catego	ory: ES	End	Semester	Exam T	ype: LE
Course Code	11235	SPC02	g - 61 - 61	Periods	Week	Credit		mum M	<u> </u>
Oodise Oode	OZSE	1 YG. 41 CAR - 플링크 기 전로만	L	Т	Р	С	CAM	ESE	TM
Course Name	Desig	n Thinking and Idea Lab	i e jejej	-	2	1	50	50	100
argemia kilo B	ranche		Commor	to ALL	Branches	3)	- And Marie	Heredrij	
Prerequisite	Basic	Knowledge of Science					er tallates for a six	-	
viil an alter st	On co	mpletion of the course, the student	s will b	able to					lapping est Level
	CO1	Demonstrate a comprehensive ussociated with the IDEA Lab.	ındersta	nding o	f the to	ools and	inventory		K2
	CO2	Develop proficiency in ideation tec solutions for various design challeng	hniques jes and p	to gene roblems	erate cre	ative and	innovative		K3
Course Outcomes	CO3	Acquire practical knowledge of med	chanical machine	and electry, tools	ctronic fa	brication p chniques u	processes, sed in the		К3
	CO4	Cultivate the skills necessary for d	evelopin ser need	g innova	ative and				K4
	CO5	Apply iterative design methodologic	es to ref	ine and functio	improve nal, aes	solutions thetic, and	based on I usability		K4

**Design process:** Traditional design, Design thinking, Existing sample design projects, Study on designs around us, Compositions/structure of a design, Innovative design: Breaking of patterns, Reframe existing design problems, Principles of creativity Empathy: Customer Needs, Insight-leaving from the lives of others/standing on the shoes of others, Observation

**Design team-Team formation, Conceptualization:** Visual thinking, Drawing/sketching, New concept thinking, Patents and Intellectual Property, Concept Generation Methodologies, Concept Selection, Concept Testing, Opportunity identification Prototyping: Principles of prototyping, Prototyping technologies, Prototype using simple things, Wooden model, Clay model, 3D printing; Experimenting/testing.

Sustainable product design, Ergonomics, Semantics, Entrepreneurship/business ideas, Product Data Specification, Establishing target specifications, Setting the final specifications. Design projects for teams.

## List of Lab Activities and Experiments

- 1. Schematic and PCB layout design of a suitable circuit, fabrication and testing of the circuit.
- 2. Machining of 3D geometry on soft material such as softwood or modelling wax.
- 3. 3D scanning of computer mouse geometry surface. 3D printing of scanned geometry using FDM or SLA printer.
- 2D profile cutting of press fit box/casing in acrylic (3 or 6 mm thickness)/cardboard, MDF (2 mm) board using laser cutter & engraver.
- 5. 2D profile cutting on plywood /MDF (6-12 mm) for press fit designs.
- 6. Familiarity and use of welding equipment.
- 7. Familiarity and use of normal and wood lathe.
- 8. Embedded programming using Arduino and/or Raspberry Pi.
- 9. Design and implementation of a capstone project involving embedded hardware, software and machined or 3D printed enclosure.
- 10. Discussion and implementation of a mini project.
- 11. Documentation of the mini project (Report and video).

Lectu	re Per	ioas:		- 1	utorial P	eriod	S: - 1 - 1	Praction	cal Periods:	30	1	Total Peri	iods: 30
Text E	Books	T. 19 1-1	Pe I t i						-14-11-16				
dand.	Tim	Brown,	Change	by	Design:	How	Design	Thinking	Transforms	Organizations	and	Inspires	Innovation,

- HarperCollins Publishers Ltd.
- 2. Workshop / Manufacturing Practices (with Lab Manual), Khanna Book Publishing.

#### Reference Books

- 1. Ulrich and Eppinger, Product Design and Development, 3rd Edition, McGraw Hill, 2004
- The Big Book of Maker Skills: Tools & Techniques for Building Great Tech Projects. Chris Hackett. Weldon Owen; 2018.
- 3. The Total Inventors Manual (Popular Science): Transform Your Idea into a Top-Selling Product. Sean Michael Ragan, Weldon Owen; 2017.
- 4. The Art of Electronics. 3rd Edition. Paul Horowitz and Winfield Hill. Cambridge University Press.
- 5. Practical Electronics for Inventors, 4th Edition, Paul Sherz and Simon Monk, McGraw Hill,
- 6. Make Your Own PCBs with EAGLE: From Schematic Designs to Finished Boards. Simon Monk and Duncan Amos. McGraw Hill Education.
- 7. Programming Arduino: Getting Started with Sketches. 2nd Edition. Simon Monk. McGraw Hill.
- 8. Venuvinod, PK., MA. W., Rapid Prototyping Laser Based and Other Technologies, Kluwer
- 9. Chapman W.A.J, "Workshop Technology", Volume I, II, III, CBS Publishers and Distributors, 5th Edition, 2002.

## Web References

1. https://onlinecourses.nptel.ac.in/noc23 mg72

## COs/POs/PSOs Mapping

COs		Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
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5	3	3	3	2	3	2		-	2	-	3	2	·		LB ∏ JE <del>1</del> ]	

Correlation Level: 1 - Low, 2 - Medium, 3 - High

-	Co	ontinuous	Assessr	nent Marks (CAI	M)		0
Assessment	Performan cl	ce in prac asses	tical	Model	et change and	End Semester	Total
. 5 (F 1897) - 3	Conduction of practical	Record work	viva	Practical Examination	Attendance	Examination (ESE) Marks	Marks
Marks	15	5	5	15	10	50	100

Department	Artificial Intelligence and Data Science			Pi	rogramme: B	.Tech			
Semester		Co	urse Ca	tegory:	ES End	Semeste	r Exam T	ype:LE	
Course Code	U23ADPC01	Pe	riods / V	Veek	Credit	, V	Maximum Marks		
		L	Т	Р	C	CAM	ESE	TM	
Course Name	Programming in Python Laboratory	0	0	2	1 1	50	50	100	
	(Common to	o All Brai	nches)			1		71471.6	
Prerequisite	NIL	USSITE OF THE	Maria Again	14-11					
	On completion of the course, the students	will be a	ble to	name)				lapping st Level	
Course	CO1 Describe common Python functionality	and feat	ures us	ed for d	ata science.		a ini p	<b>K2</b>	
Outcome	CO2 Query Data Frame structures for clear	ning and p	orocess	ing.	F GETTING	The M		<b>K</b> 2	
	CO3 Configure your programming environn	nent				e pale		<b>K</b> 3	
	CO4 Experiment the concept using data vis	ualization	1.0000000000000000000000000000000000000	er by men in	na cando con	IR Z - wy		<b>K</b> 3	

## List of Exercises

- 1. Build a python program to implement Fibonacci series.
- 2. Build a python program to get a range of numbers from user and to separate even numbers and odd numbers respectively.
- 3. Build a function in Python to check duplicate letters. It must accept a string, i.e., a sentence. The function should return True if the sentence has any word with duplicate letters, else return False.

K3

4. Build a program to perform arithmetic operations using lambda function.

CO5 Analyze real time datasets,

- 5. Build a Python program that takes a list of numbers as input and returns a new list containing only the even numbers from the input list.
- 6. Build a python program to create a class called Car with attributes Company, model, and year. Implement a method that returns the age of the car in years.
- 7. Build a python program to create a base class called Shape that has a method called area which returns the area of the shape (set it to 0 for now). Then, create two derived classes Rectangle and Circle that inherit from the Shape class to calculate the area of derived classes.
- 8. Build a python program to implement aggregation using Numpy.
- 9. Build a python program to perform Indexing and Sorting.
- 10. Build a python program to perform Handling of missing data.
- 11. Build a python program to perform usage of Pivot table using Titanic datasets
- 12. Build a python program to perform use of eval () and query ()
- 13. Build a python program to perform Scatter Plot
- 14. Build a python program to perform 3D plotting
- 15. Implement an application to process a real time data.

10. Implement an application to	process a real time data.		
Lecture Periods:	Tutorial Periods:	Practical Periods: 30	Total Periods: 30

## Reference Books

- 1. Chirag Shah, "A Hands-On Introduction to Data Science", Cambridge University Press, 2020.
- 2. Siddhartha Chatterjee, Michal Krystyanczuk, "Python Social Media Analytics", Packt Publishing, 2017.
- 3. Jake VanderPlas, "Python Data Science Handbook Essential Tools for Working with Data", O'Reily Media Inc, 2016.
- 4. Zhang.Y, "An Introduction to Python and Computer Programming", Springer Publications, 2016.
- 5. Wesley J Chun, "Core Python Programming", Pearson Education, 2nd Edition, 2006.

## Web References

- 1. https://nptel.ac.in/courses/106/106/106106212/
- 2. https://www.geeksforgeeks.org/data-analysis-visualization-python/
- 3. https://www.coursera.org/learn/python-data-analysis
- 4. https://www.python.org/
- 5. https://www.programiz.com/python-programming

COs	1	Program Outcomes (POs) O1   PO2   PO3   PO4   PO5   PO6   PO7   PO8   PO9   PO10   PO11   PO1							The state of the s						ecific (SOs)
1,	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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Correlation Level: 1 - Low, 2 - Medium, 3 - High

	Co	ntinuous A	Assess	ment Marks (CA	AM)	Territory.	12
Assessment	Performan cla	ce in pract asses	ical	Model	-	End Semester	Total
	Conduction of practical	Record work	viva	Practical Examination	Attendance	Examination (ESE) Marks	Marks
Marks	15	5	5	15	10	50	100

Department	Computer Science and Engineering	Progran	me: <b>B.</b> 1	Гесh.		J. 178		4.5
Semester		Course (	Category	: ES	End	Semester	Exam Ty	pe: LE
Course Code	U23CSPC02	Pe	riods / W	/eek	Credit	N	/laximum	Marks
		. L	T	Р	C	CAM	ESE	TM
Course Name	Data Structures Laboratory	0	0	2	1	50	50	100
	(Commo	n to all_Brar	iches)					<u> </u>
Prerequisite	Basic Programming Knowledge	- Pa E						
	On completion of the course, the stude	nts will be	able to					apping st Level)
Course Outcome	CO1 Analyse the algorithm's / program's complexity.	s efficiency	in terms	of time	and space	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		<b>(</b> 3
	CO2 Solve the given problem by identify	ring the app	ropriate	Data St	ructure.	en de	· P	<b>&lt;</b> 3
	CO3 Solve the problems of searching ar	nd sorting to	echnique	es.			F	<b>(</b> 3

K4

K4

## List of Experiments

- 1. Write a C program to implement recursive and non-recursive i) Linear search ii) Binary Search.
- 2. Write a C program to implement i) Bubble sort ii) Selection sort iii) Insertion sort iv) Shell sort v) Heap sort.

3. Write a C program to implement the following using an array, a) Stack ADT b) Queue ADT

CO4 Solve problems in linear Data Structures.

CO5 Solve problems in non-linear Data Structures.

4. Write a C program to implement list ADT to perform following operations a) Insert an element into a list. a) Delete an element from list b) Search for a key element in list c) count number of nodes in list.

5. Write a C program to implement the following using a singly linked list. a) Stack ADT b) Queue ADT.

6. Write a C program to implement the dequeue (double ended queue) ADT using a doubly linked list and an array.

7. Write a C program to perform the following operations:

- a) Insert an element into a binary search tree.
- b) Delete an element from a binary search tree.

c) Search for a key element in a binary search tree.

8. Write a C program that use recursive functions to traverse the given binary tree in

a) Preorder b) Inorder c) Postorder.

- 9. Write a C program to perform the AVL tree operations.
- 10. Write a C program to implement Graph Traversal Techniques.
- 11. Write a C program to implement the Set operations.

12. a) Union b) Intersection c) Difference.

Lecture Periods: Tutorial Periods: Practical Periods: 3 0 Total Periods: 30

## Reference Books

- 1. Yashavant Kanetkar, "Data Structures through C", BPB Publications, 3<sup>rd</sup> Edition, 2019.
- 2. Tenebaum Aaron M, "Data Structures using C', Pearson Publisher, 1st edition, 2019.
- 3. Manjunath Aradhya M and Srinivas Subramiam, "C Programming and Data Structures", Cengage India 1st edition, 2017.
- 4. Reema Thareja, "Data structures using C", Oxford University, 2<sup>nd</sup> Edition, 2014.
- 5. Gav.pai, "Data Structures and Algorithms", McGraw-Hill India, 1st edition, 2013.

#### Web References

- 1. https://www.tutorialspoint.com/data structures algorithms/
- https://www.w3schools.in/data-structures-tutorial/intro/
- 3. https://nptel.ac.in/courses/106103069/
- https://swayam.gov.in/nd1\_noc20\_cs70/preview
- 5. https://nptel.ac.in/courses/106103069/

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	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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Correlation Level: 1 - Low, 2 - Medium, 3 - High

	C	ontinuous	Assessr	nent Marks (CAM	1)		. 1-
Assessment	Performance in	n practical o	classes	Model		End Semester	Total
	Conduction of practical	Record work	viva	Practical Examination	Attendance	Examination (ESE) Marks	Marks
Marks	15	5	5	15	10	50	100

Department	Artific	ial Intelligence and Data Science	Program	me: <b>B.1</b>	Гесh				
Semester	II		Course (	Categor	y: PC	End	Semeste	r Exam T	ype: LE
Course Code	U23AI	DP202	Pe	riods / V	Veek	Credit	l N	/laximum	Marks
	ABAR.	STORY I START THE START OF THE	L	T	Р	С	CAM	ESE	TM
Course Name	Datab	ase Technologies Laboratory	0	0	2	1	50	50	100
		(/	Al &DS)	<u>'                                    </u>	3 2 1	1 7 4 4			
Prerequisite	Basic	Electrical Engineering, Laplace Tran	nsform			See L. Barry	Star Same	e Pearly N	Learne State
	On cor	npletion of the course, the studen	ts will be	able to					lapping st Level)
Course	CO1	Implement the DDL statements and	DML cor	nmands				s In Real	<b>K2</b>
Outcomes	CO2	Experiment the built in functions in	SQL					P	<b>K2</b>
	CO3	Implement PL/SQL programs.		traction desired		1,500 (4.5)		I I	K2
	CO4	Experiment Non-Relational Database	ses using	NoSQL				T I	K3
	CO5	Explore Timeseries Databases usin	g OpenT	SDB				ı	K3
		l ist of F	ynerime	nts:					

- Create Table using Data Definition Language (DDL). -
- Modify Table using Data Manipulation Language (DML).
- Store and Retrieve data through Data Control Language (DCL). 3
- Implement Constraints and Built-in functions in various tables.
- Perform Joins and Group-by functions.
- Implement Simple Programs in PL/SQL.
- Create PL/SQL programs using functions. 7.
- Create PL/SQL programs using procedures.
- Create PL/SQL programs using triggers.
- 10. Create real time applications for gathering and listing of reviews using any of the NoSQL Databases
- 11. Create a real time application for monitoring oil well using IoT databases for capturing the metrics for predictive maintenance.

**Tutorial Periods:** Practical Periods: 30 **Total Periods: 30** Lecture Periods:

#### Reference Books

- Ted Dunning and Ellen Friedman, "Time Series Databases New Ways to Store and Access Data", Pearson Education, 3<sup>rd</sup> Edition, 2019.

  Dan Sullivan," NoSQL for Mere Mortals", O'Rielly Media, 2<sup>nd</sup> Edition, 2019.
- G.K.Gupta, "Database Management Systems", Tata McGraw Hill, 2011.
- Jeffrey D. Ullman, "Principles of database systems", Computer Science Press, 1982.
- Imran Bashir, "Mastering Blockchain: A deep dive into distributed ledgers, consensus protocols, smart contracts, DApps, cryptocurrencies, Ethereum, and more", PACKT Publisher, 2020.

## Web References

- 1. https://nptel.ac.in/courses/106/106/106106095/
- https://www.geeksforgeeks.org/sql-tutorial/
- https://www.coursera.org/specializations/learn-sql-basics-data-science
- https://docs.oracle.com/cd/E11882\_01/server.112/e41084/toc.htm MySQL Online Documentation
- http://dev.mysql.com/doc/

## COs/POs/PSOs Mapping

COs					Prog	ram O	utcom	es (PO	s)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	1	2			-	-	-	-	-	3	3	3
2	3	2	2	1	2	-		-	-	-	-	-	3	3	3
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Correlation Level: 1 - Low, 2 - Medium, 3 - High

	Co	ntinuous A	Assess	ment Marks (CA	AM)		era ven-
Assessment	Performan cla	ce in pract	ical	Model		End Semester	Total
	Conduction of practical	Record work	viva	Practical Examination	Attendance	Examination (ESE) Marks	Marks
Marks	15	5	5	15	10	50	100

Department	Artificial Intelligence and Data Science	e Progra	mme: B.	Tech.				
Semester		Cou	rse Cate	ory Cod	de: AEC E	nd Semes	ter Exam	Туре: -
Course Code	U23ADC2XX	G.	Periods /	Week	Cred	it N	<b>/</b> laximum	Marks
gri tva judilo tr Jihovičik i tuvočiki		L	T	Р	С	CAM	ES E	TM
Course Name	Ability Enhancement Courses			4		100		100

Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM, Texas Instruments, Bentley, Autodesk, Eplan and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence.

Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

Department	Artific	ial Intelligence and Data Scie	A CONTRACTOR OF THE PARTY OF TH			h c		6		Shoulder -
Semester	, <mark>III</mark> <	A eliter ca waa gala waxee	Course (	Category	/ : MC	End	Semes	ter E	xam Ty	pe:
Course Code	U23A	DM202	Pe	riods / V	Veek	Credit	A LANGER	Ма	ximum	Marks
	3 , *		L	T	Р	С	CAM	E	ESE	TM
Course Name	Sport	s Yoga and NSS	0	0	2	Non-Credi	t 100			100
Prerequisite	e e			-				77-17-1		<u> </u>
		ompletion of the course, the s					Ale flexi	L :194	(Highe	Mapping est Leve
Course Outcomes		Practice Physical activities and and relaxation.  Understand basic skills associately						,		K2 K2
		and flex	ribility, balance	and co	ordinati	on.				
		Develop understanding of psyc						yıe.		K2
		Recognize the importance of n			munity	developmen	t.			K2
	CO5	Convert existing skills into soci	ially relevant li	fe skills.						K2
UNIT-I	Introd	untion to Dhysical Education				D : 1 00				
		uction to Physical Education				Periods: 06				<del></del>
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UNIT-II		and Lifestyle	***		T	Periods: 06	***************************************			1
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- 1. http://www.thebetterindia.com/140/national-service-scheme-nss
- 2. http://en.wikipedia.org/wiki/national-service-scheme 19=http://nss.nic.in/adminstruct
- 3. http://nss.nic. in
- 4. http://socialworknss.org/about.html
- 5. Young Journal on Youth published by SAGE: http://you.sagepub.com

Assessment	Con	Total		
	Attendance	MCQ Test	Presentation / Activity / Assignment	Marks
Marks	10	30	60	100

Department	Mathematics		Progra	nme : N	1.Tech.				E-01; 20
Semester	I'm gi in g			Catego		End	Semest	erExamTy	pe: <b>TE</b>
Course Code	P23MAT105		P	eriods/V	/eek	Credit	1 1 1 1 1 1 1	Maximum I	Marks
			L	Т	P	С	CAM	ESE	TM
Course Name	Probability ar	nd Statistics	2	1	. N-4	3	25	75	100
	(Al&I	OS)							
Prerequisite	Basic Mathen	natics					gran v.	10000	giren i
	On completion	n of the course, the	students will	be able	to	4 - 25-1-	Jan J. Billion British	BT Ma	
	CO1 Apply th	e concept of probabi	lity in random y	orioblo				(Highes	
		Commence holds on a little of		100					3
	1 5 7 7 1 1	e basic rules of conti						K	
Course Outcome	CO3 Apply the problem	e concept of testing or s.	of hypothesis f	or small	and larg	ge samples	in real li	fe K	2
	CO4 Concep	t of linear regression,	correlation, ar	id its ap	plication	าร	1	K	3
		guidelines for design n Design of Experime		s and re	ecognize	the key his	storical	К	3
UNIT – I		dom Variables	J. 11.3.			Periods:12	2		<del></del>
		t spaces – The probabi	ility mass function	n – Distr	I			Geometric	7
Negative Binomia	al and Poisson.								CO1
UNIT – II	Continuous	Random Variables				Periods:12	)		
Some important	distributions –	Exponential distribution	on -Gamma -	Weibull	i			oplication of	of CO2
distribution – Rel	iability – Failure o	lensity and Hazard fund	ction.						
UNIT – III	Testing of Hy					Periods:12			
testing of means,	variance and pro	d large samples –Tests oportions — Contingen	cy table (test for	independ	dent) Go	odness of fit.			CO3
UNIT – IV		nd Regression				Periods:12			
Correlation –Ran – Coefficient of m	k correlation– Re nultiple correlation	gression –Multiple and n – Coefficient of partial	l partial correlation.	on – Met	hod of le	ast squares	– Plane c	of regressio	n CO4
UNIT – V	Design of Ex				- 1	Periods:12			
Analysis of variar Latin square desi	nce – One way a ign - 2 <sup>2</sup> Factorial	nd two-way classification design.	ons – Completel	/ random	nized des	sign – Rando	mized blo	ock design	CO5
LecturePeriod	s:45	TutorialPeriods:15	Practic	alPerio	ds:-	To	otalPerio	ds:60	
Text Books							***************************************		-
1. B.S.Grewal	, "Higher Engin	eering Mathematics",	Khanna publis	hers - F	Paperba	ack – 3 <sup>rd</sup> Ed	dition - 2	2017.	
		Statistics and Rando							
3. Gupta. S. 0 2023.	C., and Kapoor,	V.K., "Fundamentals	of Mathematic	al Statis	stics", S	ultan Chand	and So	ns, 12th E	dition,
Reference Boo	ks	· · · · · · · · · · · · · · · · · · ·							
1. Ravish R. Sir	ngh, Mukul Bha	tt "Engineering Mathe	ematics", McGi	aw-Hill,	1 <sup>st</sup> Editio	on, 2017.			
	ndenhall, Robe	t J. Beaver, Barbar	a M. Beaver:	"Introdu	uction to	Probabilit	y & Sta	tistics", C	engage
Learning; 15 <sup>th</sup> Edition 20	019.								
<ol><li>Richard .A. J Pearson Edu</li></ol>	ohnson, Irwin N cation, Asia, 9 <sup>th</sup>	filler and John E. Fre 'Edition, 2018.	eund," Probabili	ty and S	Statistics	for Engine	ers",	#	
		d. EhsanesSaleh, "Ar	n Introduction t	o Proba	bility an	d Statistics"	', Wiley -	- 2008.	
5. <u>E. Rukmang</u> a	<u>adachari,</u> "Prob	ability and Statistics",	Pearson Educ	ation In	dia, 201	2.			
		Para and the second							

- 1. http://www.stat110.net
- 2. <a href="http://www.nptel.ac.in/courses/111105035">http://www.nptel.ac.in/courses/111105035</a> (R.V)
- 3. <a href="http://www.probabilitycourse.com">http://www.probabilitycourse.com</a>.
- 4. www.edx.org/Probability
- 5. http://www2.aueb.gr/users/demos/pro-stat.pdf

## COs/POs/PSOs Mapping

CO-	Program Outcomes (POs)						Program Specification Outcomes (PSC			
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	
1	2	1	er jare		Y 14-1	1	1	2	1	
2	3	2	1	1		1	2	2	1 -	
3	3	2	1	1	-	1	2	2	1	
4	3	2	1	1			2	2	: 1	
5	3	2	1	1	-	-	2	2	1	

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment	(	Continuo	ous Asse	(CAM)	End Semester	Total	
	CAT 1	CAT 2	Model Exam	Assignment *	Attendance	Examination (ESE)	Marks
	-	- 1		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	) Y 1	Marks	Tophaller
Marks	1	0	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

	Artificial Intelligence and Data Science	ce Programme : M.Tech.  Course Category: PC End SemesterExamType:T						
Semester	Miller Calley Atthouse				End	Semeste	erExamTy <sub>l</sub>	e: <b>TE</b>
Course Code	P23ADT101	Pe	riods/W	eek	Credit	1 - 12 - 249	Maximum	Marks
		L	Т	Р	С	CAM	ESE	TM
Course Name	Machine Learning Algorithms	3	-		3	40	60	100
	( AI&DS)	terranici.	Element	dada e	8	Lung (bar)	Mary lay	
Prerequisite	NIL							
	On completion of the course, the student	ts will be	able to				BT Ma	apping
0	The bold of the part of the second						(Highes	
Course Outcome	CO1 Understand the concepts of machine regression models	e learning	algorithr	ms and	acquire kno	wledge c	on K	2
	CO2 Explore the classification models and	d analyze	the clus	tering al	gorithms		К	3
	CO3 Demonstrate the dimensionality redu	uction tech	niques					3
	CO4 Explore of Decision learning algorith			learning	1		K	
	CO5 Acquire knowledge on ensemble lea				7			K3
UNIT – I	Introduction to Machine Learning				Periods:9		1,72,	110
	3 1 para - 0 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	12 = 1			Name of the second			
	e Learning - Types of Machine Learning Algorithm on – Multivariate Linear Regression – Logistic Re		reproces	sing - Int	roduction of	Regressic	n Algorithm	s CO1
UNIT – II	Classification and Clustering Models	***************************************		<u>-</u>	Periods:9			
	ication Algorithms – Support Vector Machine –	Naive Ba	ves – cla			onal prob	ahilities – k	( (0)
earest Neighbor	- Basics of Clustering Algorithms - K-Means clus	stering - K-l	Medians ·	– Hierard	chical Cluster	ing – App	lications.	
UNIT – III	Dimensionality Reduction Techniques				Periods:9			
	Dimensionality Reduction Techniques set Selection - Principal Component Analysis	(PCA) - F	actor an		Periods:9 Multidimens		ling - Linea	ar
troduction- Sub	Dimensionality Reduction Techniques  set Selection - Principal Component Analysis ysis (LDA) Case Study.	(PCA) - F	actor an				ling - Linea	:
troduction- Sub	pset Selection - Principal Component Analysis ysis (LDA) Case Study.		actor an	alysis –	Multidimens		ling - Linea	:
ntroduction– Sub iscriminant Anal UNIT – IV ecision tree repi	pset Selection - Principal Component Analysis ysis (LDA) Case Study.  Decision Trees and Rule Based Learning resentation - ID3 - CART - Hidden Morkov Mod	g		alysis –	Multidimens Periods:9	ional Sca	THE STATE OF THE S	co
troduction— Subsiscriminant Anal  UNIT – IV ecision tree reprist Apriori and E	Decision Trees and Rule Based Learning resentation – ID3 – CART – Hidden Morkov Mod quivalence Class Transformation Algorithm	g		alysis –	Multidimens Periods:9  - Associatio	ional Sca	THE STATE OF THE S	cos
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troduction— Sub iscriminant Anal UNIT – IV ecision tree reprite Apriori and E UNIT – V	Decision Trees and Rule Based Learning resentation – ID3 – CART – Hidden Morkov Mod quivalence Class Transformation Algorithm  Ensemble Learning aging: Random Forest – Boosting: Adaboost and	g del - Assoc XGBoost A	ation rule	alysis –	Multidimens Periods:9  - Associatio Periods:9  BM - Stackin	n rules - (	THE STATE OF THE S	s CO
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troduction— Subscriminant Anal  UNIT – IV ecision tree reprists Apriori and E  UNIT – V troduction – Bag  LecturePoext Books  1. Henrik 2017. 2. Tom M. 3. Timothy 2022. 4. Peter Hardeference Boo 1. Charu (Knowled) 2. Andreas edition,	Decision Trees and Rule Based Learning resentation – ID3 – CART – Hidden Morkov Modquivalence Class Transformation Algorithm  Ensemble Learning aging: Random Forest – Boosting: Adaboost and Brink, Joseph W. Richards, and Mark Feth Mitchell, "Machine Learning", McGraw-Hill Str. Howard Jackson "Al and Machine Learning arrington, "Machine Learning in action", Manks  C. Aggarwal, "Data Classification Algorithm age Discovery Series.  C. Mueller and Sarah Guido, "Introduction 2016.	g del - Assoc  XGBoost A  Pra  herolf, "Re  Science, 19 for Coder  ning Publi  ns and Ap  on to Mac	lgorithms acticalP eal-Worl 997. s: A Pro cation, 2 pplication	alysis –  I e mining  I s Light G  Geriods:  Id Mach  Gramme  2012.  Ins", Cha	Multidimens Periods:9 - Associatio Periods:9 BM - Stackin -0 ine Learnin er's Guide to apman & H	ional Sca n rules - ( ng Tota ng", Man o Artificia lall/CRC ", O'Reil	Periods:4 ning Publi I Intelligen Data Min ly Media,	CO: S CO: S CO: S CO: Inc. 1
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Web R	eferences	
1.	https://www.coursera.org/learn/machine-learning	
2.	https://ml-cheatsheet.readthedocs.io/en/latest/regression_algos.html	
3.	https://machinelearningmastery.com/a-tour-of-machine-learning-algo	orithms/
4.	https://www.coursera.org/learn/machine-learning.	The Professional Action of the Control of the Contr

https://www.youtube.com/watch?v=Gwlo3gDZCVQ

COs		Progra	m Out			ram Spo omes (P			
74 4	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	2	2	1	2	2	3	2	2
2	1	2	2	2	2	2	3	2	2
3	2	- 3	3	- 1-	3	3	3	3	3
4	2	3	3	1	3	3	3	3	3
5	2	3	3	1	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment		Continu	ous Asse	ssment Marks	(CAM)	End Semester	Total
Paris -	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	1	0	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Semester	7 11 111101	al Intelligence and Data Science	Program	me: <b>M.</b> 1	Гесһ.	er er omme fyn i legar			
	1		Course (	Category	y: PC	End S	Semester	Exam Typ	oe: TE
Course Code	P23AD	T102	Per	ods / W	/eek	Credit	4800.88	Maximum	Marks
			L	Т	Р	С	CAM	ESE	TM
Course Name	Comp	ıting Systems for Data Science	3	piliwi-9 -	duiden e	3	40	60	100
		(	AI&DS)	ga far old	ALC: DE	Proportional		eletarings.	GH : F 1/-
Prerequisite	Comput	er Organization and Architecture/Op	perating Sy	stem/D	atabase	e Manageme	ent Systen	ns	Arrenta e
Course	On com	npletion of the course, the studen						(Highe	fapping
Outcomes	Understand the issues related to the design and analysis of systems with reatime constraints and to learn the features of Real time OS							-	K3
	CO2 Classify and Compare various Uniprocessor and Multiprocessor scheduling mechanisms								K3
	CO3	Categorize the difference between	traditional	and rea	al time o	databases.			K2
	CO4	Acquire knowledge about Data Sto	rage and I	Manage	ment T	echnologies			K3
	CO5	Perceive information about St components.	torage Ar	ea Ne	etworks	characteris	stics and	<u> </u>	K3
UNIT-I	Introd				T	Periods: 9		<u> </u>	
anguages for Rea  UNIT-II  Real time OS – The	Real-ti	me OS nd Tasks – Structure of Microkernel –	Time service	es - Sc		Periods: 9	Commun	ication and	- CO.
Synchronization –	Event No	tification and Software interrupt Task as or task scheduling - Clock-driven and pri	signment a	nd Sche	duling -	Task allocation	n algorithn	ns - Sinale	d CO2
UNIT-III	Real ti	me Databases				Periods: 9			
Real time Databas	T								
		isaction priorities – Concurrency control	issues – D	isk sche	duling al	gorithms – Tv	vo phase a	pproach to	1
nprove predictabil	Large	saction priorities – Concurrency control  Data Storage		· <del></del>		Periods: 9	4)		CO3
nprove predictabil  UNIT-IV  lard Disks- Netwo	Large orked Att	saction priorities – Concurrency control		· <del></del>		Periods: 9	4)		COS
nprove predictabil  UNIT-IV  lard Disks- Netwo	Large orked Attesign- Çad	Data Storage tached Storage-Scalability issues- Net		· <del></del>	orage A	Periods: 9 rchitecture -	4)		CO3
UNIT-IV lard Disks- Netwood System Description UNIT-V torage Area Netwo	Large orked Attesign- Çar	Data Storage tached Storage-Scalability issues- Net	tworking iss	sues. St	orage A	Periods: 9 Periods: 9 age QoS— Periods: 9	Storage F	Partitioning	- CO4
UNIT-IV lard Disks- Netwood torage System Description UNIT-V torage Area Netwo	Large orked Attesign- Çar Storag vorks – H	Data Storage tached Storage-Scalability issues- Netching-Legacy Systems.  e Area Networks lardware and Software Components, S Trends related to Copy data managements	tworking iss storage-Cluse ent Erasure	sues. St	orage A	Periods: 9 rchitecture - Periods: 9 rge QoS- Periods: 9	Storage F	Partitioning Reliability Diances.	CO3
UNIT-IV lard Disks- Netwitorage System De UNIT-V torage Area Netwind Security issues Lecture Pe	Large orked Attesign- Çar Storag vorks – H	Data Storage tached Storage-Scalability issues- Netching-Legacy Systems.  e Area Networks lardware and Software Components, S Trends related to Copy data managements	tworking iss storage-Cluse ent Erasure	sues. States	orage A	Periods: 9 rchitecture - Periods: 9 rge QoS- Periods: 9	Storage F	Partitioning	- CO2
UNIT-IV Hard Disks- Netwood Disks- Netwo	Large orked Attesign- Car Storag works – H s. Recent eriods: 3	Data Storage tached Storage-Scalability issues- Netching-Legacy Systems.  e Area Networks lardware and Software Components, S Trends related to Copy data managements	tworking issets to rage-Clustent Erasure  Pra  cGraw Hill ion India, 2	ters/Gric coding-a ctical P	orage A ds. Stora and Soft eriods:	Periods: 9 Irchitecture - Periods: 9 Ige QoS- Periods defined seriods: - edition, 201	Storage F formance, storage app Total 7.	Partitioning Reliability bliances.  Periods:	CO2
UNIT-IV Hard Disks- Netwood Disks- Netwo	Large orked Attesign- Car Storag vorks – H s. Recent eriods: 3 chna, Kar B. Liu, Re Baruah, onal Publ	Data Storage tached Storage-Scalability issues- Net ching-Legacy Systems.  e Area Networks lardware and Software Components, S Trends related to Copy data management of Tutorial Periods: 15  ng G. Shin – Real Time Systems, Meal-Time Systems", Pearson Educat Marko Bertogna, Giorgio Buttazzo	tworking issets to rage-Clustent Erasure  Pra  cGraw Hill ion India, 2	ters/Gric coding-a ctical P	orage A ds. Stora and Soft eriods:	Periods: 9 Irchitecture - Periods: 9 Ige QoS- Periods defined seriods: - edition, 201	Storage F formance, storage app Total 7.	Partitioning Reliability bliances.  Periods:	CO3

- 1. https://datascience.columbia.edu/research/centers/computing-systems-for-data-driven-science/https://www.guru99.com/what-is-tableau.html
- 2. https://www.geeksforgeeks.org/real-time-operating-system-rtos/
- 3. https://hazelcast.com/glossary/real-time-database/
- 4. https://www.simplilearn.com/big-data-storage-article
- 5. https://www.techtarget.com/searchstorage/definition/big-data-storage

## COs/POs/PSOs Mapping

COs		Progra	m Out	comes	(POs		Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	P06	PSO1	PSO2	PSO3	
1	2	3	2	AND THE	<u>u</u> es l	€ <u>.</u> '75	1	2	1	
2	3	3	3	-	1	-	2	2	1	
3	2	3	2	1	2		2	2	1	
4	3	3	3	1	3	-	2	2	1	
- 5	3	3	3	1	3	4	2	2	11	

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment		Continu	ous Asse	ssment Marks (	CAM)	End Semester	Total
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	1	0	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

		ial Intelligence and Data Science	<u> </u>		Tech.			1,000	
Semester	e legation.		Course (			End 9	Semeste	r Exam Typ	oe: <b>TE</b>
Course Code	P23AD	OT103	Per	iods / V	Veek	Credit		Maximum	Marks
distriction	r i delse		j. j.L.	Т	Р	С	CAM	ESE	TM
Course Name	Artific System		3	in-in-te en-ide		)	40	60	100
			AI&DS)	75 10		-4 F. P. P. M. V.	i, chuice	Desireded	
Prerequisite	1								- Abril 1
Course	On con	npletion of the course, the studen						(Highe	Mapping
Outcomes	CO1	Acquire an insight into the difference problems for which solutions a algorithmic approach							K3
	CO2	Learn the different approaches of develop systems that demonstration uncertainty							K3
	CO3	Formulate solutions by applying world problems.	the planni	ng and	learnin	g approach	ies to re	eal	K2
	CO4	Learn the intelligent computing me problems can be solved by ada intelligence							K3
	CO5 Examine case studies, learn the benefits of hybridization and propose new hybrid								K3
	CO5	Examine case studies, learn the bialgorithms and validate their results		nybridiz	ation an	a propose r	new nybr	10	ιλυ
est-first search,	Introd lem-solvii Greedy		arch technic rsarial sear	ques: BF	S, DFS,	UCS, Heuris	Perio tic search	ods: 9 techniques	-
istory of AI, Probest-first search, eduction – AND/GUNIT-II  pproaches for kesolution, Sema	Introd In	algorithms and validate their results uction and Search Techniques on through search, state-space, blind search, A* search, AO* search, Adverse, Constraint satisfaction problem, Mean ledge Representation Techniques tainty representation, Propositional Logic, Provorks, Forward Chaining, Backward Control of the control of	arch technic rsarial sear s Ends Ana and Reas	ques: Bf ch: Min lysis. coning	i-max sea under	UCS, Heuris arch, alpha-	Periode Period	techniques off, Probler ods: 9	n CO
istory of AI, Probest-first search, eduction – AND/GUNIT-II  pproaches for kesolution, Semarobability Theory	Introd Idem-solvii Greedy : OR Graph  Know uncer nowledge antic netv , Bayes R	algorithms and validate their results uction and Search Techniques on through search, state-space, blind search, A* search, AO* search, Adverse, Constraint satisfaction problem, Mean ledge Representation Techniques tainty  representation, Propositional Logic, Provorks, Forward Chaining, Backward Chaile, Bayesian Belief Networks.	arch technic rsarial sear s Ends Ana and Reas	ques: Bf ch: Min lysis. coning	i-max sea under	UCS, Heuris arch, alpha-	Periodic search beta cut  Periodepresenta anaging	techniques off, Probler ods: 9	n CO
istory of AI, Probest-first search, eduction – AND/OUNIT-II  pproaches for kesolution, Semarobability Theory UNIT-III	Introd In	algorithms and validate their results uction and Search Techniques on through search, state-space, blind search, A* search, AO* search, Adverse, Constraint satisfaction problem, Mean ledge Representation Techniques tainty  representation, Propositional Logic, Provorks, Forward Chaining, Backward Chaile, Bayesian Belief Networks.	arch technic rsarial sear s Ends Ana and Reas edicate Log Chaining, U	ques: BF ch: Min lysis. coning gic, Rule Inificatio	e based In an, Re	UCS, Heuris arch, alpha- arch,	Periodic search beta cut  Periodepresenta anaging  Periodepresenta	techniques off, Probler ods: 9 tion, Conflic Uncertainty	co
istory of AI, Probest-first search, eduction – AND/O  UNIT-II  pproaches for k esolution, Semarobability Theory  UNIT-III  tate space plan	Introd In	algorithms and validate their results uction and Search Techniques on through search, state-space, blind search, A* search, AO* search, Adverse, Constraint satisfaction problem, Mean ledge Representation Techniques tainty  representation, Propositional Logic, Provorks, Forward Chaining, Backward Chaile, Bayesian Belief Networks.	arch technic rsarial sear s Ends Ana and Reas edicate Log Chaining, U	ques: BF ch: Min lysis. coning gic, Rule Inificatio	under based Fin an, Receptainty,	UCS, Heuris arch, alpha-	Periodic search beta cut  Periodic sepresentar anaging  Periodic sepresentar anaging	techniques off, Probler ods: 9 tion, Conflic Uncertainty ods: 9	co
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istory of AI, Probest-first search, eduction — AND/O  UNIT-II  pproaches for k esolution, Semarobability Theory  UNIT-III  tate space planearning by takin einforcement Leauring to the education to Intervented the education of the etworks-Types, volutionary Algorithm of the education of the educ	Introd Intelligent S In	algorithms and validate their results uction and Search Techniques on through search, state-space, blind search, A* search, AO* search, Adversearch, A* search, AO* search, Mean search, A* search, AO* search, Adversearch, AC* search, Adversearch, AC* search, Adversearch, AO* search, Adversearch, AO* search, Adversearch, AO* search, Adversearch, Mean Medge Representation problem, Mean Redge Representation Techniques tainty  representation, Propositional Logic, Provoks, Forward Chaining, Backward Chaining, Backward Chaining, Backward Chaining, Backward Chaining and Learning tial order planning, Planning graphs, Explanation based learning, Supervised gent Computing Models  Systems, knowing when to use Intelligent functions, Learning algorithms, Fuzzy Learning Algorithm, Swarm intelligence- Parentic Algorithm, Swarm intelligence-	arch technic rsarial sear s Ends Ana and Reas redicate Log Chaining, U	ques: BF ch: Min lysis.  soning gic, Rule Inification under un upervise s, Mode sets an n Optimi	under e based k n an, Re certainty, ed learnin es of inte d operation	UCS, Heurisiarch, alpha- knowledge resolution, M Learning T g, Decision	Period Pe	techniques off, Probler ods: 9 tion, Conflic Uncertainty ods: 9 tte Learning ods: 9 ficial Neura zy Inference	co
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- 1. Stuart J Russell, Peter Norvig, Artificial Intelligence- A Modern Approach, 4th Edition, Pearson Education, 2020.
- 2. Geoff Hulten, Building Intelligent Systems A Guide to Machine Learning Engineering, Apress, 1st edition, 2018.
- 3. Crina Grosan and Ajith Abraham, Intelligent Systems- A Modern Approach, Springer Intelligent Systems Reference Library Book 17, 2011.
- 4. Michael Negnevitsky, Artificial Intelligence: A Guide to Intelligent Systems, 3<sup>rd</sup> edition, 2011.
- 5. Christopher M. Bishop, Pattern Recognition and Machine Learning, 1st edition, 2006.

#### Web References

- 1. https://www.ibm.com/topics/data-science
- 2. https://www.oracle.com/in/what-is-data-science/
- 3. https://u-next.com/blogs/data-science/importance-of-data-science/
- 4. https://monkeylearn.com/text-analysis/
- 5. https://www.toptal.com/designers/data-visualization/data-visualization-tools

## COs/POs/PSOs Mapping

COs	il .	Progra							am Specific mes (PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	
1	2	3	2	-	-	-	1	2	1	
2	3	3	3	-	1		2	2	1	
3	2	3	2	1	2	-	2	2	1	
4	3	3	3	1	3	-	2	2	1	
5	3	3	3	1	3	-	2	2	1	

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment		Continu	ous Asse	End Semester	Total		
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	10		15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Semester	- <del> </del>	cial Intelligence and Data Science		nme: <b>M.</b>		d <sub>a</sub> e e eu	e a zinaka A	s Kesst Jejaka			
0011100101	1		y Code	: <b>HS</b> End	Semeste	r Exam T	ype:T				
Course Code	P23H	STC01	Pe	riods / V	Veek	Credit	M	laximum Mark			
			L	T.	Р	С	CAM	ES E	TM		
Course Name	Resea	arch Methodology and IPR	2	Media	-s-f-13-1	2	40	60	100		
er den de		(Common to	all M.Tech P	rogramr	ne)			1 1 1 1 1 1	A Ares		
Prerequisite	No pre	erequisite needed				E'hi akiri		1600			
	On completion of the course, the students will be able to										
Course	CO1 Gain Knowledge to formulate the research problem.										
Outcomes		Understand the concepts to car			review	, ethics and	l research	K			
		analysis.									
		Explain the way of writing technic						K	2		
	CO4	nformation ativity.	K2								
	CO5	Ability to understand about IPR	and filing par	tents in I	R & D.		-	K	3		
UNIT-I	Rese	arch Problem Formulation	31			Periods: 6		1			
UNIT-II	Litors										
	1	ature Review approaches – analysis – plagiarism a	and research	ethics		Periods: 6			CO2		
ffective literature	studies	approaches – analysis – plagiarism a	and research	ethics					CO2		
ffective literature	studies	approaches – analysis – plagiarism a	·		al - form	Periods: 6	h proposal		CO2		
ffective literature UNIT-III  ffective technica resentation and	Techi I writing assessm	approaches – analysis – plagiarism anical Writing /Presentation - how to write report – paper - development by a review committee.	ping a researd	ch propos	al - form	Periods: 6	h proposal				
UNIT-III  Iffective technica resentation and UNIT-IV	Techi I writing assessn	approaches – analysis – plagiarism anical Writing /Presentation - how to write report – paper - development by a review committee.  Suction To Intellectual Property	ping a researd	h propos		Periods: 6 nat of researc					
UNIT-III  Iffective technica Presentation and UNIT-IV  Iature of intellectivesearch – innova	Techi I writing assessn Introcual propution – pa	approaches – analysis – plagiarism anical Writing /Presentation - how to write report – paper - development by a review committee.	ping a researd  Rights (IPR pyright. Proce	ch propos ) ss of pate	enting a	Periods: 6 nat of researc  Periods: 6 nd developme	ent: technol	ogical	CO3		
UNIT-III  Iffective technica Presentation and UNIT-IV  Iature of intellectivesearch – innova	Techi I writing assessn Introc ual propution – pants of pa	approaches – analysis – plagiarism anical Writing /Presentation - how to write report – paper - development by a review committee.  Suction To Intellectual Property erty: patents – designs - trade and contenting - development. International services	ping a researd  Rights (IPR pyright. Proce	ch propos ) ss of pate	enting a	Periods: 6 nat of researc  Periods: 6 nd developme	ent: technol	ogical	CO2		
UNIT-III  Iffective technical resentation and UNIT-IV  lature of intellective search — innovarocedure for granuntum.  UNIT-V  Patent Rights: So	Techi I writing assessn Introc ual propution – pants of pa Intellectope of F	approaches – analysis – plagiarism anical Writing /Presentation - how to write report – paper - development by a review committee.  Suction To Intellectual Property erty: patents – designs - trade and contenting - development. International stents - patenting under pct.  Patent Rights - Licensing and transfer pments in IPR - Administration of Pate	Rights (IPR pyright. Procescenario: inter	) ss of patenational of the patent Patent PR of Bio	enting a coopera	Periods: 6 nat of research Periods: 6 nd development tion on intellection and datal	ent: technol ctual proper	ogical rty -	CO3		
UNIT-III  Iffective technical resentation and UNIT-IV  lature of intellective search — innovarocedure for granuntum.  UNIT-V  Patent Rights: So	Techi I writing assessn Introc ual propution – pants of pa Intellecope of F	approaches – analysis – plagiarism and prical Writing /Presentation  - how to write report – paper - development by a review committee.  Suction To Intellectual Property erty: patents – designs - trade and contenting - development. International stents - patenting under pct.  Patent Rights - Licensing and transfer pments in IPR - Administration of Patent Traditional knowledge C	Rights (IPR pyright. Procescenario: inter of technology ent System - I ase Studies -	) ss of patenational of the patent Patent PR of Bio	enting a coopera informa blogical IITs.	Periods: 6 nat of researc  Periods: 6 nd developmention on intelled  Periods: 6 tion and datal Systems - Co	ent: technol ctual proper ° pases - Geo mputer Sof	ogical rty -	CO3		
UNIT-IV lature of intellectresearch – innovarocedure for gran UNIT-V Patent Rights: So	Techi I writing assessn Introc ual propution – pants of pa Intellecope of F	approaches – analysis – plagiarism and prical Writing /Presentation  - how to write report – paper - development by a review committee.  Suction To Intellectual Property erty: patents – designs - trade and contenting - development. International stents - patenting under pct.  Patent Rights - Licensing and transfer pments in IPR - Administration of Patent Traditional knowledge C	Rights (IPR pyright. Procescenario: inter of technology ent System - I ase Studies -	) ss of patenational of the patenation of Bio IPR and	enting a coopera informa blogical IITs.	Periods: 6 nat of researc  Periods: 6 nd developmention on intelled  Periods: 6 tion and datal Systems - Co	ent: technol ctual proper ° pases - Geo mputer Sof	ogical rty - ographical tware etc.	CO3		
UNIT-III  Iffective technical resentation and UNIT-IV  Itature of intellectresearch – innovarocedure for grant UNIT-V  Patent Rights: Solndications - New Lecture Pole (ext Books)  Stuart Melville (enwyn Publish)  Wayne Godda	Techil I writing assessm Introc ual propition – pa nts of pa Intelle cope of F v Develo eriods:	nical Writing /Presentation - how to write report – paper - development by a review committee.  duction To Intellectual Property erty: patents – designs - trade and contenting - development. International statents - patenting under pct.  ectual Property Rights (IPR) Patent Rights - Licensing and transfer pments in IPR - Administration of Patent Traditional knowledge Communications of Patent Rights - International Reprise Communications of Patent Rights - International Repri	Rights (IPR pyright. Procescenario: inter of technologyent System - I ase Studies - Pr dology: An indology: A	h proposes  ss of paternational of the proposes of paternational of the proposes of the propos	enting a coopera informa ological IITs.  Periods on for s	Periods: 6 nat of researc  Periods: 6 nd developmention on intellection and datal Systems - Co  cience & En	ent: technol ctual proper pases - Geo mputer Sof Total F gineering	ogical rty - ographical tware etc. Periods: 3	CO3		
UNIT-III  Effective technical Presentation and UNIT-IV  Ilature of intellective for grant UNIT-V  Patent Rights: Solindications - New Lecture Policett Books  Stuart Melville Eenwyn Publish Wayne Godda C.R. Kothari,	Introcual propution – pants of pants of parts of parts of parts of parts of pants of	nical Writing /Presentation - how to write report – paper - development by a review committee.  duction To Intellectual Property erty: patents – designs - trade and contenting - development. International stents - patenting under pct.  ectual Property Rights (IPR) Patent Rights - Licensing and transfer pments in IPR - Administration of Patent Traditional knowledge Communications of Patent Rights - International Reprinces of Patent Rights - Administration of Rights -	Rights (IPR pyright. Procescenario: inter of technologyent System - I ase Studies - Pr dology: An indology: A	h proposes  ss of paternational of the proposes of paternational of the proposes of the propos	enting a coopera informa ological IITs.  Periods on for s	Periods: 6 nat of researc  Periods: 6 nd developmention on intellection and datal Systems - Co  cience & En	ent: technol ctual proper pases - Geo mputer Sof Total F gineering	ogical rty - ographical tware etc. Periods: 3	CO3		

- 1. https://www.scribd.com/document/427419672/Research-Methodology-and-lpr
- 2. https://www.isical.ac.in/~palash/research-methodology/RM-lec9.pdf 3. https://www.wipo.int/edocs/pubdocs/en/intproperty/958/wipo\_pub\_958\_3.pdf
- 4. https://lecturenotes.in/m/21513-research-methodology
- 5. https://iare.ac.in/sites/default/files/MTECH-CAD.CAM-R18-RM-IP-NOTES.pd

## COs/POs/PSOs Mapping

Sto E_T		Progra	m Out	Program Specifi Outcomes (PSC					
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	3	2	1	1	2	1	3	3	2
2	3	2	1	1	2	1	3	2	2
3	3	2	1	1	2	1	3	2	2
4	3	2	1	1	3	1	3	2	3
5	3	2	1	1	2	1	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

## **Evaluation Methods**

# 4 * p = 1		Conti	nuous As	End	<ul> <li>V 5m.</li> </ul>		
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Semester Examination (ESE) Marks	Total Marks
Marks	10		15	10	5	60	100

Assignment to be given from Unit-5

Department	Artificial Intelligence and Data Science Programme: M.Tech.								May 14		
Semester	Leman .		Course	Categor	ster Exam Type: LE						
Course Code	P23ADP101			Periods / Week Credit					Maximum Marks		
Course Coue	LOADI	Terra	T	Р	C	CAM	ESE	TM			
Course Name	Machine Laborato	Learning Algorithms ry	i i i i i i i i i i i i i i i i i i i	(A (B) (B) (B) (B)	4	2	50	50	100		
		Pitaka manna i tagakeka	(Al&DS)	Year	WELL C			to bearing			
Prerequisite	Knowled	ge about Machine Learning Alg	orithms		- (44 - 1 4 1 - 1 - 2 - 1 1				Level		
Course	On completion of the course, the students will be able to										
Outcomes	CO1 To apply supervised algorithms and unsupervised algorithms.								(Highest Level) K4		
	CO2 To	K3									
	CO3 To	K2									
	CO4 To	K3									
	CO5 To	K2									

## List of Exercises

- 1. Support Vector Machine
- 2. Naive Bayes
- 3. K-Nearest Neighbor
- 4. Linear Regression and Logistic Regression
- 5. K-Means and K-Medians
- 6. Principal Component Analysis and Linear Discriminant Analysis
- 7. Decision Tree Algorithm
- 8. Naïve Bayes ensemble
- 9. Random forests
- 10. Adaboost and XGBoost

Lecture Periods:	Tutorial Periods: -	Practical Periods: 45	Total Periods: 45
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## Reference Books

- Andreas C. Mueller and Sarah Guido, "Introduction to Machine Learning with Python", O'Reilly Media, Inc. 1st edition, 2016.
- Henrik Brink, Joseph W. Richards, and Mark Fetherolf, "Real-World Machine Learning", Manning Publications, 2017.
- 3. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar, "Foundations of Machine Learning", The MIT Press, 2nd Edition, 2009.

## COs/POs/PSOs Mapping

COs	1	Progra	m Out	Program Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	2	2	3	2	2	3	2	2
2	1	2	2	2	2	2	3	2	2
3	1	3	3	3	3	3	3	3	3
4	2	3	3	3	3	3	3	3	3
5	1	3	3	3	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment	Со						
	Performancia	e in practi	cal	Model		End Semester	Total
Are er om Carl	Conduction of practical	Record work	viva	Practical Examination	Attendance	Examination (ESE) Marks	Marks
Marks	15	5	5	15	10	50	100

Department	Artific	cial Intelligence and Data Science	Program	ime: M.	ech.					
Semester	1		Course	Categor	y Code:	<b>HS</b> End	Semeste	er Exam 7	ype: LE	
Course Code	P23H	SPC01	Periods / Week Credit			Credit	Maximum Marks			
Course Code	1 2311		L	T.	Р	С	CAM	ESE	TM	
Course Name	Techi	nical Report Writing and Seminar	- · · · · · · · · · · · · · · · · · · ·		4	2	100	<b>i</b>	100	
	-	(Common to all M.Tech Programme)								
Prerequisite	Parti.			() Spread	a salmardi		alkeri oli a	Terror	total.	
Course	On completion of the course, the students will be able to								BT Mapping (Highest Level	
Course Outcomes	CO1	Select a subject, narrowing the subject					K2			
Outcomes	CO2	State an objective and collecting the papers).	relevant b	oibliogra	phy (at I	east 15 jour	rnal	il K2		
	CO3	Study the papers and understanding analyzing each paper.	the autho	r's cont	ibutions	and critica	lly	ly K3		
	CO4	Prepare a working outline and linking paper.	ers and	preparin	g a draft of	the	K2			
	CO5	Prepare a working outline and linking paper.	ng the pap	ers and	preparir	ng a draft of	the	K2		

List of Experiments

Activity	Instructions	Submission week	Evaluation
Selection of area of interest and Topic	Select an area of interest, topic and state an objective	2 <sup>nd</sup> week	3 % Based on clarity of thought, current relevance and clarity in writing
Stating an Objective			· · · · · · · · · · · · · · · · · · ·
Collecting Information about area & topic	List 1 Special Interest Groups or professional society     List 2 journals     List 2 conferences, symposia or workshops     List 1 thesis title     List 3 web presences (mailing lists, forums, news sites)     List 3 authors who publish regularly in your area	3 <sup>rd</sup> week	3% (the selected information must be area specific and of international and national standard)
IX I	7. Attach a call for papers (CFP) from your area.		
Collection of Journal papers in the topic in the context of the	using- Based on your objective -Search various digital libraries and Google Scholar	4 <sup>th</sup> week	6% ( the list of standard papers and reason for selection)
objective – collect 20 & then filte	<ul> <li>When picking papers to read - try to:</li> <li>Pick papers that are related to each other in some ways and/or that are in the same field so that you can write a meaningful survey out of them.</li> </ul>		
	- Favour papers from well-known journals and conferences, in the field (as indicated in other Favour more recent papers,	erane o. "	
	- Pick a recent survey of the field so you can quickly gain an overview, Find relationships with respect to each other and to your topic area(classification scheme/categorization)		
	<ul> <li>Mark in the hard copy of papers whether complete work or section/sections of the paper are being considered</li> </ul>		
Reading and notes for first 5 papers	Reading Paper Process For each paper form a Table answering the following questions:  • What is the main topic of the article?		
	want to discuss?  • Why did the author claim it was important?		
	• What was/were the main issue(s) the author said they want to discuss?		

	<ul> <li>How did to their work at their work at the What did research?</li> </ul>	the author do? the author claim they were goin and compare it to others? the author say were the limitathe author say were the important	ations of their	6 <sup>th</sup> week	8% ( The table given should indicate your understanding of the paper and the evaluation is based on your conclusions about each paper)
Kamayara a	for future re  Conclude		les de deside		
Reading and notes for next 5 papers		ading Paper Process		7 th week	8% ( the table given should indicate your understanding of the paper and the evaluation is based on your conclusions about each paper
Draft outline 1 and Linking papers		draft Outline, your survey goals, on / categorization diagram	, along with a	8 th week	8% ( this component will be evaluated based on the linking and classification among the papers)
Abstract	Prepare a c	draft abstract and give a presen	tation	9 th week	6%(Clarity, purpose and conclusion) 6% Presentation & Viva Voce
Introduction Background	Write an int	troduction and background sect	ions	10th week	5% ( clarity)
Sections of the paper	classification	sections of your paper ba on / categorization diagram in f your survey		11th week	10% (this component will be evaluated based on the linking and classification among the papers)
Conclusions	Write your	conclusions and future work		12th week	5% (conclusions)
Final Draft	Complete ti	he final draft of your paper		13th week	10% (formatting, English, Clarity and linking) 4% Plagiarism Check Repor
Seminar	A brief 15 s	lides on your paper	= ī.	14th & 15th week	10% (based on presentation and Vivavoce)
Lecture Perio	ds: -	Tutorial Periods: -	Practic	al Periods: 45	Total Periods: 45

COs		Progra	m Out		Program Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	3	3	1	3	3	2	1	2
2	2	3	2	- 1	3	2	2	1	2
3	2	3	2	1	3	2	2	1	2
4	2	3	2	1	3	2	2	1	2
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Correlation Level: 1 - Low, 2 - Medium, 3 - High

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Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM, Texas Instruments, Bentley, Autodesk, Eplan and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence.

Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

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### COs/POs/PSOs Mapping

COs		Progra	m Out		Program Specific Outcomes (PSOs)				
- 1	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	3	2	- 15	-	-	1	2	1
2	3	3	3		1	-	2	2	1
3	2	3	2	1	2	-	2	2	1
4	3	3	3	1	3	-	2	2	1
5	3	3	3	1	3	-	2	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment	dimensional	Continu	ous Asse	ssment Marks (	CAM)	End Semester	Total
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	1	0	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Semester	Artifici	al Intelligence and Data Science	Programme				710, 12 9	11 11 11 11	
OCITICOTO	II di eng		Course Cat				Semester E		
Course Code	P23AD	T205	Period			Credit	ļ	Maximum	
		기회 이 원리를 하는데 되었다. 그 나는 생각을 받는데	L	T	Р	С	CAM	ESE	TM
Course Name	Natura	I Language Processing	3	-	- 1   1   1   1   1   1   1   1   1   1	3	40	60	100
		The state of the s	AI &DS)		1.484		u Al-Albertui	ai nef	4-1-5
Prerequisite	Machir	ne Learning							
visio ka aktorea.	On con	pletion of the course, the studen	ts will be ab	le to	100		LIPER L. F.	BT N	lapping
		The state of the s						(Highe	st Level)
Course Outcomes	CO1	Understand the basics of NLP				Aller Mills			K3
Outcomes	CO2	Apply the basic ML and DL technic	ues for NLP					K	2, K3
	CO3	Understand and realize the advance		hniai	IPS			-	K2
	CO4	Understand the concept of NLU				oncent of I	nformation		2,K3
	004	Retrieval	, NEO ana	аррі	1110 00	эпоорт от т	morriadio		2,113
	005	A landing to be followed while I	Luilding All D	A	lications	and have to	a uga NII E		K3
	CO5	Apply ethics to be followed while I Libraries	building NLP	App	ications	and now to	use INLF		11.5
UNIT – I	Introd					Periods:9	- 1		
		ocessing: Tokenization, Stemming and		n, Po	s Taggin	g, Named Ei	ntity Recog	nition. NL	
eature Engineeri	ng, Word	Count Vector, Word Sense Disambigua	tion						co
UNIT – II	Langu	age Modelling				Periods:9		81	
J -gram Models,	Hidden	Markov Models, Maximum Likelihood	Estimation. S	uper	rised, Un	supervised	and Semi	Supervise	d CO
CNN for NLP.		n and Sentiment Analysis, Topic Modell		91	-			2 1	
UNIT – III		nced NLP Techniques	A 1.11 1	DE		Periods:9			
sequence- to -Se	quence IVI	odels, Attention Mechanisms, Transform	ier Architectur	e. dc	KI, GPI				co
UNIT – IV	Langu	age Understanding and Generation	on, Informat	ion	1	Periods:9			
			- Gave	51.1		12.300			
ext Generation, ext Indexing and	Question	<b>val</b> Answering, Dialogue Systems and Ch  Text Summarization.	atbots. Machi	ne Tra	anslation,	, Cross Ling	ual Transfe	r Learnin	CO
Text Indexing and	Question Search,	Answering, Dialogue Systems and Ch Text Summarization.		ne Tra		Cross Ling	ual Transfe	r Learnin	CO
UNIT - V Bias and Fairnes	Question Search, NLP T	Answering, Dialogue Systems and Ch Text Summarization.  Tools, Libraries, Applications, Ethi P. Privacy Concerns in NLP Application	ics ons. NP librari	es:	NLTŘ, S	Periods:9 pacy, Tenso	r Flow, Py	torch. NL	P
UNIT - V Bias and Fairnes	Question Search, NLP T	Answering, Dialogue Systems and Ch Text Summarization.  Ools, Libraries, Applications, Ethi	ics ons. NP librari	es:	NLTŘ, S	Periods:9 pacy, Tenso	r Flow, Py	torch. NL	
UNIT - V Bias and Fairnes	Question Search, NLP T s in NLF timent Ana	Answering, Dialogue Systems and Ch Text Summarization.  Tools, Libraries, Applications, Ethi Privacy Concerns in NLP Application alysis, Named Entity Recognition in Rea	i <b>cs</b> ons. NP librari I World Data S	es: Sets, T	NLTŘ, S	Periods:9 pacy, Tenso sification for V	r Flow, Py Various Doi	torch. NL	P co
UNIT – V Bias and Fairnes Applications: Sen	Question Search, NLP T s in NLF timent Ana	Answering, Dialogue Systems and Ch Text Summarization.  Tools, Libraries, Applications, Ethi Privacy Concerns in NLP Application alysis, Named Entity Recognition in Rea	i <b>cs</b> ons. NP librari I World Data S	es: Sets, T	NLTK, S ext Class	Periods:9 pacy, Tenso sification for V	r Flow, Py Various Doi	torch. NL nains.	P co
UNIT – V Bias and Fairnes Applications: Sen LectureF Textbooks	Question Search, NLP T s in NLP ciment And eriods:4	Answering, Dialogue Systems and Chart Summarization.  Tools, Libraries, Applications, Ethion, Privacy Concerns in NLP Applicationallysis, Named Entity Recognition in Real TutorialPeriods:0	ics ons. NP librari I World Data S Prac	es: Sets, T ticalF	NLTŘ, S ext Class Periods:	Periods:9 pacy, Tenso sification for V	r Flow, Py Various Doi <b>Lect</b> u	torch. NL mains. rePerioc	P cc
UNIT – V Bias and Fairnes Applications: Sen LectureF Textbooks  1. Vijay M	Question Search, NLP T is in NLF ciment And reriods:4	Answering, Dialogue Systems and Charlest Summarization.  Tools, Libraries, Applications, Ethion, Privacy Concerns in NLP Applicationallysis, Named Entity Recognition in Real TutorialPeriods:0  TutorialPeriods:0	ics ons. NP librari I World Data S Pract	es: Sets, T ticalF	NLTK, S ext Class Periods:	Periods:9 pacy, Tenso sification for V -0 ach", VPT,	r Flow, Py Various Doi <b>Lect</b> u	torch. NL mains. rePerioc	P co
UNIT – V Bias and Fairnes Applications: Sen  Lecture  Textbooks  1. Vijay M.  2. James A	Question Search, NLP T is in NLF ciment And reriods:4	Answering, Dialogue Systems and Charlest Summarization.  Tools, Libraries, Applications, Ethics, Privacy Concerns in NLP Applicationallysis, Named Entity Recognition in Real TutorialPeriods:0  TutorialPeriods:0  and Arshdeep Bahga, "Internet of Thatural Language Understanding", 2 <sup>nd</sup>	ics ons. NP librari I World Data S Prac hings: A Han	es: Sets, T ticalF ds-or	NLTK, S ext Class Periods:  Approa	Periods:9 pacy, Tenso sification for \( \) -0  ach", VPT, \( \) on, 2003.	r Flow, Py Various Doi <b>Lect</b> u	torch. NL mains. rePerioc ,2014.	P cc
UNIT – V Bias and Fairnes Applications: Sen LectureF Fextbooks  1. Vijay M 2. James A 3. Jurafsky 4. Srini Ja	Question Search, NLP T s in NLP ciment And reriods:4 adisetti a Allen, "Na y, Dan ar narthana	Answering, Dialogue Systems and Chart Summarization.  Tools, Libraries, Applications, Ethio, Privacy Concerns in NLP Applicationallysis, Named Entity Recognition in Real TutorialPeriods:0  TutorialPeriods:0  and Arshdeep Bahga, "Internet of Tile Tural Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language, "Hands-On Chatbots and Converged to the Tutorial Converged	ics ons. NP librari I World Data S Pract hings: A Hand Edition, Pea	es: Sets, T ticalF ds-or arson ssing"	NLTK, S ext Class Periods:  Approa	Periods:9 pacy, Tensosification for V -0 ach", VPT, fon, 2003.	r Flow, Py Various Don Lectu	torch. NL mains. rePeriod ,2014.	P CC
UNIT – V Bias and Fairnes Applications: Sent LectureF Fextbooks  1. Vijay M 2. James A 3. Jurafsky 4. Srini Ja Publish	Question Search, NLP T s in NLP ciment And reriods:4 adisetti a Allen, "Na y, Dan ar marthana	Answering, Dialogue Systems and Charlest Summarization.  Fools, Libraries, Applications, Ethic, Privacy Concerns in NLP Applicationallysis, Named Entity Recognition in Real TutorialPeriods:0  Ind Arshdeep Bahga, "Internet of Tlatural Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, James, "Speech and Language Understanding", 2 <sup>nd</sup> and Martin, Martin, Martin, Martin, Martin, M	ics ons. NP librari I World Data S Prac hings: A Han Edition, Pea	es: Sets, T ticalF ds-or urson ssing"	NLTŘ, S Text Class Periods: n Approa Education , 2 <sup>nd</sup> Education	Periods:9 pacy, Tenso sification for V  -0  ach", VPT, on, 2003. lition, Prenti Build chatb	r Flow, Py Various Don Lectu 1 <sup>st</sup> edition ice Hall, 20 ots", Publi	torch. NL mains. rePeriod ,2014.	P CO

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- Daniel M.Bikel and Imed Zitouni, "Multilingual Natural Language Processing Applications: From Theory To Practice" Pearson Publications, 2019
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### COs/POs/PSOs Mapping

COs		Progra	m Out	ik-i	Program Specific Outcomes (PSOs)				
21, 1,	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	3	2	-	-		1	2	1
2	3	3	3	-	1	-	2	2	1
3	2	3	2	1	2		2	2	- 1
4	3	3	3	1	3		2	2	1
5	3	3	3	1	3	-	2	- 2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment		Continu	ous Asse	<b>End Semester</b>	Total		
. Neg	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	1	0	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

	Artificial Intelligence and Data Science		ne: M.T			73.75.6		THE	
Semester		Course C			End	Semeste	r Exam Type	TE	
Course Code	P23ADT206	Peri	ods / We	eek	Credit	202	Maximum N	1arks	
		L- L-	T	Р	<u>C</u>	CAM	ESE	TM	
Course Name	Advanced Deep Learning	3		•	3	40	60	100	
		AI &DS)	e entre						
Prerequisite	Machine Learning						Property of		
The bushists.	On completion of the course, the student	ts will be a	ble to				BT Ma	pping	
	And the second of the second of the second of						(Highest		
Course Outcomes	CO1 Understand basic neural network	activation f	unction	and los	s functions		(Flighesi		
Outcomes	CO2 Able to apply different Convolution						K		
	CO3 Understand different deep learning regularization and optimization methods.								
	CO4 Understand different Neural Netwo		ition and	Optimi	Zation meti	ious.	K		
		A first for	ad erega	CER BEH	erantu i				
	CO5 Understand Neural Style transfer a	nd autoend	oding p				K	2	
UNIT – I	Foundations Of Neural Networks The Biological Neuron-The Perceptron - Multi		1411124 21		Periods:9				
Reconstruction - H	function Notation - Loss Functions for Regress yperparameters: Learning Rate – Momentum – S					- Loss	Functions for		
UNIT – II	CNN	1 2 19 3			Periods:9				
	ks: Layer Type - Convolutional Layer - Activation opout - Common architecture and Training Patter						tch	CO2	
UNIT – III	Optimization				Periods:9		1		
	ropout Regularization - Normalizing Inputs- Van								
n Exponentially W	Gradients - Gradient Checking. Mini-batch Gradien Gradient Descent with Mom cal Optima - Transfer learning and Fine tuning.							CO3	
UNIT – IV	RNN				Periods:9		river (ALT) - I		
	A	irectional RN	NN - LST	M – GR	U - Seq2Sed	paradigr	n -	CO4	
	ving Feed Forward Language Model - RNN - Bid eq.	irectional re							
nultilength Seq2S	eq.	inadias é.	4 4		Periods:9			0	
UNIT - V /alue iteration - C	eq.	adient metho		critic m				0	
unitilength Seq2S  UNIT - V  Value iteration - C	Deep Reinforcement Learning  Learning - Basic deep Q Learning - Policy granvolutional autoencoding - variational autoencoding	adient methong - Generat		critic m	nethod - Exp letwork (GAI	V).		CO5	
nultilength Seq2S  UNIT - V  Value iteration - Coutoencoding - cor	Deep Reinforcement Learning  Learning - Basic deep Q Learning - Policy granvolutional autoencoding - variational autoencoding	adient methong - Generat	tive Adve	critic m	nethod - Exp letwork (GAI	V).	eplay - Basic	CO5	
UNIT – V Value iteration - Coutoencoding - cor LecturePore	Deep Reinforcement Learning  Learning - Basic deep Q Learning - Policy granvolutional autoencoding - variational autoencoding	adient methong - General	tive Adve	critic m	nethod - Exp letwork (GAI	V).	eplay - Basic	COS	
UNIT - V Value iteration - Coutoencoding - con LecturePorextbooks  1. Eugene	Deep Reinforcement Learning  Learning - Basic deep Q Learning - Policy granvolutional autoencoding - variational autoencoding  TutorialPeriods:0	adient methong - General Pra	tive Adve	critic mrsarial N	nethod - Exp letwork (GAI	N).	eplay - Basic	COS	
UNIT – V Value iteration - Coutoencoding - cou  LecturePo extbooks  1. Eugene 2. Ian Good	Deep Reinforcement Learning  Learning - Basic deep Q Learning - Policy graphy olutional autoencoding - variational autoencoding - TutorialPeriods:0  Charniak, "Introduction to Deep Learning", N	Adient methong - General Pra MIT Press, 2	tive Adve	critic mrsarial Neriods:	nethod - Exp letwork (GAI	N).	eplay - Basic	CO5	
UNIT – V Value iteration - Coutoencoding - con LecturePotextbooks  1. Eugene 2. Ian Good 3. Charu C	Deep Reinforcement Learning  Learning - Basic deep Q Learning - Policy grant autoencoding - variational autoencoding - variationa	Adient methong - General Pra MIT Press, 2	tive Adve	critic mrsarial Neriods:	nethod - Exp letwork (GAI	N).	eplay - Basic	CO5	
UNIT – V /alue iteration - Country /alue ite	Deep Reinforcement Learning Learning - Basic deep Q Learning - Policy granvolutional autoencoding - variational autoencoding - va	Adient methong - General Pra  //IT Press, 2 eep Learning, Spr	ecticalPo 2019. ng", MIT inger, 20	eritic m resarial N eriods: Press,	nethod - Expletwork (GAI	N). Lect	eplay - Basid	CO5	
UNIT – V /alue iteration - Control of the control o	Deep Reinforcement Learning Learning - Basic deep Q Learning - Policy granvolutional autoencoding - variational autoencoding - va	Adient methong - General Pra MIT Press, 2 eep Learnir arning", Spr	2019. ng", MIT inger, 20	eritic mrsarial Neriods: Press,	nethod - Expletwork (GAI  -0  1st edition t of View",	N). Lect	eplay - Basid	CO5	
UNIT – V /alue iteration - Coutoencoding - con LecturePo Textbooks  1. Eugene 2. Ian Good 3. Charu C References  1. Cosma Press, 2 2. Deng & Y	Deep Reinforcement Learning Learning - Basic deep Q Learning - Policy granvolutional autoencoding - variational autoencoding - va	Adient methorng - General Pra  MIT Press, 2 eep Learning, Spra  from an El	2019. ng", MIT inger, 20	Press, 2014	nethod - Expletwork (GAI	N). Lect	eplay - Basid	CO5	
UNIT – V Value iteration – Contoencoding – contutoencoding – contu	Deep Reinforcement Learning Learning - Basic deep Q Learning - Policy granwolutional autoencoding - variational Autoencoding - Va	Adient methong - General Pra  MIT Press, 2 eep Learning, Spr  from an El ens, Now P	2019. ng", MIT inger, 20 ementar	Press, 2014 Press, 2014	nethod - Expletwork (GAI -0   1st edition, to of View", 2015.	2016	eplay - Basid	CO5	
UNIT – V Value iteration – Contoencoding – con	Deep Reinforcement Learning Learning - Basic deep Q Learning - Policy granvolutional autoencoding - variational autoencoding - va	Adient methong - General Pra  MIT Press, 2 eep Learning, Spr  from an El ons, Now P ng, Determactitioner's	2019. ng", MIT inger, 20 ementar rublisher nination Approac	Press, 2014 Press, 2014	nethod - Expletwork (GAI -0   1st edition, to of View", 2015.	2016	eplay - Basid	CO5	

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### COs/POs/PSOs Mapping

COs		Progra	m Out	comes	(POs			ecific (SOs)	
5.4	P01	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	3	2	muni	11 24	eg i bo	100	2	: 10 ·
2	3	3	3		1		2	2	1
3	2	3	2	1	2	E 12120	2	2	1
4	3	3	3	1	3	-	2	2	1
5	3	3	3	1	3	-	2	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment		Continu	ous Asse	essment Marks	(CAM)	End Semester	Total
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	1	0	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

A PROPERTY OF THE PROPERTY OF THE PARTY OF THE PARTY.	- <del> </del>	al Intelligence and Data Science	Program						
Semester	. 11		Course				Semester	Exam Ty	
Course Code	P23AD	T207		iods / W		Credit	<u> </u>	Maximun	<del></del>
Course Name	Al and	Robotic Process Automation	L 3	T.	P	C 3	CAM 40	ESE 60	TM 100
- Course Marie	1, , , ,		AI &DS)				1	Friden	1
Prerequisite	Τ-	<u> </u>	Al abo)						
						The second			
Course	On con	npletion of the course, the studen	ts will be	able to					Mapping est Leve
Outcomes	CO1	Describe RPA, where it can be ap	plied and I	now it's	impleme	nted.		7	K3
	CO2 Describe the Different Types of Variables, Control Flow and Data Manipulation Techniques							on K	2, K3
	CO3	Identify and understand Image, Te	xt and Da	ta Table	s Autom	ation.		61 F	K2
	CO4	Describe how to handle the Use strategies.	r Events	and var	ious type	es of Exce	eptions ar	nd K	2, K3
	CO5	Understand the Deployment of the	e Robot ar	nd to ma	aintain th	e connection	on.		K3
UNIT – I	NIT – I Introduction to Robotic Process Automation Periods:9  s RPA - RPA vs Automation - Processes & Flowcharts - Programming Constructs in RPA - RPA Advanced								
usiness case - F	RPA Tear	es - RPA Development methodologies - n - Process Design Document/Solution and emerging ecosystem.							
	À Tool - T	ool Introduction and Basics he User Interface - Variables - Control F			nents - Lo				CC
ntroduction to RP. low - Control Flow the While Activity	Å Tool - T w Activitie - The for	ool Introduction and Basics	vity - The D Manipulat	o While A	nents - Lo Activity - I	ops - Flowcl The If Activit ation Introdu	y-The Swi	tch Activity	
ntroduction to RP. Flow - Control Flow The While Activity ariables, collection	A Tool - Tow Activitien - The for ons and Ta	ool Introduction and Basics The User Interface - Variables - Control F s - The Assign Activity - The Delay Activ Each Activity - The Break Activity - Data ables - Text Manipulation - Data Manipu acced Automation Concepts & Tecl	vity - The D Manipulat lation - Gat	o While / on- Data hering ar	nents - Lo Activity - T a Manipula nd Assem	ops - Flowcl The If Activit ation Introdu bling Data Periods:9	y-The Swi action - Sca	tch Activity	
ntroduction to RP. Flow - Control Flow The While Activity ariables, collection  UNIT - III Recording Introduction  Oata Scraping - Scraping - Scraping - Scraping Selectors	A Tool - Tow Activities - The forms and Towns and Towns and Towns are tion - Baccraping accs - Partial bl Data Ta	ool Introduction and Basics he User Interface - Variables - Control F s - The Assign Activity - The Delay Activ Each Activity - The Break Activity - Data ables - Text Manipulation - Data Manipu	vity - The D Manipulat lation - Gat nniques rding - Inpu ag and Asse kt & Advance	o While / on- Data hering an t/Output essing Se ced Citrix	nents - Lo Activity - T Manipula nd Assem  Methods electors -	ops - Flowd The If Activit ation Introdu bling Data Periods:9 - Screen Sc Customizati ion Introduc	y-The Swinction - Scanning - on -Debugtion to Ima	tch Activity alar gging - ige & Text	
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#### Reference Books

- 1. Frank Casale, Rebecca Dilla, Heidi Jaynes, Lauren Livingston, "Introduction to Robotic Process Automation:
- 2. a Primer", Institute of Robotic Process Automation, 1st edition 2015.
- Richard Murdoch, Robotic Process Automation: Guide to Building Software Robots, Automate Repetitive Tasks & become an RPA Consultant", Independently Published, 1st edition 2018.
- 4. Srikanth Merianda," Robotic Process Automation Tools, Process Automation and their benefits: Understanding RPA and Intelligent Automation", Consulting Opportunity Holdings LLC, 1st edition 2018.
- 5. Lim Mei Ying, "Robotic Process Automation with Blue Prism Quick Start Guide: Create software robots and automate business processes", Packt Publishing, 1st edition 2018.

#### Web References

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- 2. https://www.academy.uipath.com
- 3. https://www.guru99.com/deep-learning-tutorial.html
- 4. https://www.coursera.org/specializations/deep-learning
- 5. http://neuralnetworksanddeeplearning.com/

### COs/POs/PSOs Mapping

COs	v 15=_	Progra	m Out	comes	(POs		Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	
1	2	3	2	a =1.7	-		1 -	2	1	
2	3	3	3		1	- 4	2	2	1	
3	2	3	2	- 1	2	-	2	2	1	
4	3	3	3	1	3	-	2	2	1	
5	3	3	3	1	3	a 1.53 a	2	2	1	

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment		Continu	ous Asse	essment Marks	(CAM)	End Semester	Total
6	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	End Semester Examination (ESE) Marks	Marks
Marks	1	0	15	10	<sub>2</sub> 5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	Artificial Intelligence and Data Science										
Semester		Course (	Category	Code:	PC End	d Semeste	er Exam T	ype: LE			
Course Code	P23ADP202	Peri	Periods / Week			Ма	ximum Ma	arks			
Course Code	Passer Service Converse Addition of the	Course Category Code: PC	ESE	TM							
Course Name	Advanced Deep Learning Laboratory	Maria da	34456 <b>-</b> 5	4	2	50	50	100			
		Al &DS)									
Prerequisite	NIL										
vill belakens	On completion of the course, the stude	nts will be	able to	gar ja tang	draphysis issu	Manual dys.	BT Map (Highes	ping t Level)			
Course	CO1 Understand the role of neural netwo	orks in en	gineering	& artif	icial intellige	nce.	K2				
Outcomes	CO2 Understand regularization methods	for gradie	ent proble	em.	Addi Tiriyar		r	(2			
CO3 Apply various optimization techniques and fine-tuning process.											
	CO4 Understand various Neural Network models.							(3			
	CO5 Apply deep learning Network in var						, P				

#### **List of Exercises**

- 1. Build a simple neural network
- 2. Build a deep learning model to Classify cat and dog using CNN
- 3. Build a deep learning model to predict Stock Prices using Recurrent Neural Network
- 4. Build a deep learning model to Forecast Sales using LSTM
- 5. Build a deep learning model to predict Movie box office using GRU model
- 6. Build a deep learning model to predict Sports result Prediction using RNN and LSTM
- 7. Build a deep learning model to predict Cardiovascular Disease using ANN
- 8. Build a deep learning model to create an art using Style Transfer technique
- 9. Build a deep learning model to a identify traffic signs from the image
- 10. Build a deep learning model for Fashion Recommendation System

Lecture Periods:	Tutorial Periods:	Practical Periods: 30	Total Periods: 30
Deference Books			

#### Reference Books

- Cosma Rohilla Shalizi, "Advanced Data Analysis from an Elementary Point of View", Cambridge University Press, 2015.
- 2. Deng & Yu, "Deep Learning: Methods and Applications", Now Publishers, 2014.
- 3. Michael Nielsen, "Neural Networks and Deep Learning", Determination Press, 2015.
- 4. Josh Patterson, Adam Gibson, "Deep Learning A Practitioner's Approach", O'Reilly Media, 2017.
- 5. Nikhil Buduma, "Fundamentals of Deep Learning", O'Reilly, 2017.

#### Web References

- 1. https://nptel.ac.in/courses/106/106/106106212/
- 2. https://www.geeksforgeeks.org/data-analysis-visualization-python/
- 3. https://www.coursera.org/learn/python-data-analysis
- 4. https://www.python.org/
- 5. https://www.programiz.com/python-programming

COs							Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	
1	3	3	3	3	2	3	3.4	3	0.2	
2	3	2	2	2	1	2	2	2	1	
3	3	1	1	1	2	1	1.5	ar, 1aal	2	
4	3	1	1	2	2	1	2	1	2	
5	3	2	2	2	3	2	2	2	3	

Correlation Level: 1 - Low, 2 - Medium, 3 – High

	Со	ntinuous A	Assessi	ment Marks (CA	(M)	ortice of	
Assessment		-	End Semester	Total			
	Conduction of practical	Record work	viva	Practical Examination	Attendance	Examination (ESE) Marks	Marks
Marks	15	5	5	15	10	50	100

Department	Artificial Intelligence and Data Science									
Semester		Course (	Category	/ : HS	End	Semester	Exam Ty	pe: LE		
Course Code		Periods / Week			Credit	Ma	aximum Marks			
Course Code	P23HSPC02	aj * Lacaj	T T	Р	С	CAM	ESE	TM		
Course Name	Seminar on ICT: A Hands-on Approach	4 A-16		4	2	100		100		
egan Brogress n	(Common to all I	M.Tech Pr	ogramm	nes)	Pik toba	- F - 1984				
Prerequisite	No Prerequisite needed	II. (122)	4.4	v			"Plane"	grifa e e		
Course	On completion of the cour	se, the st	udents	will be	able to		BT Ma	The second		
Outcomes	CO1 Select a topic, narrowing the topic in	to present	ation.			***************************************	K			
	CO2 State an objective and use the relevant	ant ICT to	ols to ma	ake the	e presentation	n effective.	К	3		
	CO3 Study the topic and understanding th	ne contribu	itions ar	nd prep	are report.	= 11	K	2		
	CO4 Prepare a working demo.	king demo.								
CO5 Prepare conclusions based on the reading of the topic and giving final Presentation.								4		
1 - 29	List of E	xperimen	ts:							

The methodology used is "learning by doing", a hands-on approach, enabling the students to follow their own pace. The teacher, after explaining the project, became a tutor, answering questions and helping students on their learning experience. ICT skills

- Understand ICT workflow in the respective domain choosed.
- · Manage multitasking.
- Deal with main issues using tech in class.
- Record, edit and deliver audio and video.
- · Automate assessments and results.

#### Scope

- Perspective in order to design activities in class.
- · Understand the process of creating audiovisuals.

#### Teaching tools

- · Different ways to create audiovisual activities.
- · Handle audiovisual editors.
- · Collaborative working.
- · Individualize learning experience.
- · Get instant feedback from students.

Each one of the students will be assigned an ICT Topic and the student has to conduct a detailed study on the assigned topic and prepare a report, running to 30 or 40 pages for which a demo to be performed followed by a brief question and answer session. The demo will be evaluated by the internal assessment committee (comprising of the Head of the Department and two faculty members) for a total of 100 marks.

Lecture Periods: - Tutorial Periods: - Practical Periods: 45 Total Periods: 45

#### COs/POs/PSOs Mapping

COs	ı	Progra	m Out	)	Program Specific Outcomes (PSOs)				
	PO1	PO1 PO2 PO3 PO4 PO5 PO6					PSO1	PSO2	PSO3
1	-	3	1	1	3	3	3	2	1
2	-	3	1	1	3	2	3	2	1
3		3	1	1	3	2	3	2	1
4	-	3	1	1	3	2	3	2	. 1
5	-	3	1	1	3	2	3	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

	Cont	Continuous Assessment Marks (CAM)						
Assessment	Performa	ince in practica		End Semester Examination	Total			
ng gradi. Agis - nga Sajortika dayak k	Presentation using ICT	Report	viva	Attendance	(ESE) Marks	Marks		
Marks	30	30	30	10	Che intern	100		

Department	Artificial Intelligence and Data Science	Program	nme: M	.Tech.	4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			T 5 54
Semester	d (5.5) (3.45), 77.5 (5.5) (5.5) (5.5) (6.5) (6.5) (6.5)	Course	Catego	ry Code	: AEC End	Semeste	er Exam T	ype: -
Course Code	P23ADC2XX	Pe	riods / \	Veek	Credit	N	Maximum Marks	
	Life and the production of the control of the contr	La.	T	Р	С	CAM	ESE	TM
Course Name	ABILITY ENHANCEMENT COURSES			4		100	-	100
				- 4 4 40		the said of the said		

Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM, Texas Instruments, Bentley, Autodesk, Eplan and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence.

Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

Department	Artificial Intelligence and Data Science Programme: M.Tech.  Course Category: PE End Semester Exam Type									
Semester		Course C	ategor	y: PE	End S	Semeste	r Exam Typ	e: TE		
Course Code	P23ADEC01	Perio	ods / W	/eek	Credit	71/30 7/3	Maximum	Marks		
- Course Code	T ZOAD ZOOT	L	Т	P	С	CAM	ESE	TM		
Course Name	Agile and Software Project Management	3	9 <b>-</b> 9	02.19 <u>1</u> 44 (£1	3	40	60	100		
	(Common to M.Tech	CSE(BDA)	and A	I and DS	3)					
Prerequisite		20 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -		7		1.25 . 5 . 5				
	On completion of the course, the student	s will ha a	hle to				DTA	lanning		
	On completion of the course, the student	5 WIII DE a	DIE 10			rii in terrii. Taran araba	DIN	Mapping		
Course	· · · · · · · · · · · · · · · · · · ·	Professional Applies Concession (1987)					(Highest Le			
Outcomes	CO1 Perform Software engineering proces	processes.						K2		
	CO2 Make use of software design.							K3		
	CO3 Apply different software testing strate	rategies.						K3		
	CO4 Illustrate different Agile Methodology.							K2		
	CO5 Make use of different process of Agile	- Motherdal								
UNIT-I	1	e Methodol	logy.				i	K3		
	Software Engineering Processes ring concepts – Development activities – Software	dovoless	-4 lif-		-la O - "		ods: 9	1		
UNIT-II	Software Design	peca i	-, 4	4 1	- 2- 1	Perio	ods: 9			
<ul> <li>Project planning</li> </ul>	ring concepts – Development activities – Software g – Estimation – Scheduling – Risk managemen	t - Softwar	e config	guration r	managemen	e project i t - Projec	managemer t Planning	4		
Project planning impirical Estimati oftware Requiren	g – Estimation – Scheduling – Risk managemen ion Techniques – Staffing Level Estimation – S nents specification.	t - Softwar	e config	guration r	managemen	e project i t - Projec tructures	managemer et Planning – Staffing	4		
Project planning impirical Estimati oftware Requirer	g – Estimation – Scheduling – Risk managemen ion Techniques – Staffing Level Estimation – Sments specification.  Software Testing	t – Softwar cheduling -	e config - Organ	guration r	managemen and Team s	e project i t - Projec tructures Perio	managemer et Planning - Staffing ods: 9			
Project planning impirical Estimati coftware Requirer  UNIT-III ntroduction to Sof	g – Estimation – Scheduling – Risk managemen ion Techniques – Staffing Level Estimation – S nents specification.	t – Softwar cheduling -	e config - Organ	guration r	managemen and Team s	e project i t - Projec tructures Perio	managemer et Planning - Staffing ods: 9	<u>s</u>		
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- 1. https://www.coursera.org/courses?query=software%20engineering
- 2. https://www.edx.org/learn/software-engineering
- 3. https://www.udemy.com/courses/development/software-engineering/
- 4. https://www.coursera.org/learn/agile-software-development
- 5. https://www.tutorialspoint.com/sdlc/sdlc\_agile\_model.htm

### COs/POs/PSOs Mapping

COs		Progra	m Out			ram Spo omes (P			
	PO1	PO2	PO3	PO6	PSO1	PSO2	PSO3		
1	2	3	2			-1-	1	2	1
2	3	3	3	- d 14	. 1	11.25	2	2	1
3	2	3	2	1	2	12.5	2	2	1
4	3	3	3	. 1	3		2	2	1
5	3	3	3	1	3	-	2	2	= (1)

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment		Continu	ous Ass	essment Marks	(CAM)	End Semester	Total
ni diangat Tangangan Tangan	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	1	0	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Semester         I         Course Category: PE         End Semester Exam Ty           Course Code         P23ADE101         Periods / Week         Credit         Maximum           L         T         P         C         CAM         ESE           Course Name         Python for Data Science         3         -         -         3         40         60           (AI &DS)           Prerequisite         Python Basics	
L T P C CAM ESE	
L T P C CAM ESE	Marks
(AI &DS)	TM
	100
Prerequisite Python Basics	Telegraphic
On completion of the course, the students will be able to	1apping
이번 선생님들이 이번 그렇게 가게 보는 말이 되었다. 선생님은 전쟁 사람이 되었다면 하는 것이 되었다면 하다.	100
	est Level)
	K2
	K2
	K2
CO4 Apply matplotlib for plotting and visualizing the datasets	K3
CO5 Demonstrate data aggregation and time series analysis using python programming	K3
UNIT-I Introduction to Data Science Periods: 9	
Data science process - Roles, Stages in data science project - Working with data from files - Working with relational databases	I
Exploring data – Managing data – Cleaning and sampling for modeling and validation.	CO
UNIT II D. C. CN D. L. CN D. L. CN D. C.	
UNIT-II Basics of Numpy, Pandas, and Vectorized Computation Periods: 9  The Numpy ndarray: A Multidimensional Array Object – Universal Functions: Fast Element-wise Array Functions – Data Processin	
Hierarchical Indexing.	
UNIT-III Data Preprocessing, Wrangling, and Transformation Periods: 9	
	-
Data preprocessing: Reading and Writing Data in Text Format - Binary Data Formats - Interacting with HTML and Web APIs	
Data preprocessing: Reading and Writing Data in Text Format – Binary Data Formats – Interacting with HTML and Web APIs interacting with Databases.	CO
Data preprocessing: Reading and Writing Data in Text Format – Binary Data Formats – Interacting with HTML and Web APIs interacting with Databases.  Data wrangling and transformation: Combining and Merging Data Sets – Reshaping and Pivoting – Data Transformation – String	CO3
Data preprocessing: Reading and Writing Data in Text Format – Binary Data Formats – Interacting with HTML and Web APIs interacting with Databases.  Data wrangling and transformation: Combining and Merging Data Sets – Reshaping and Pivoting – Data Transformation – Strin Manipulation – USDA Food Database	COS
Data preprocessing: Reading and Writing Data in Text Format – Binary Data Formats – Interacting with HTML and Web APIs interacting with Databases.  Data wrangling and transformation: Combining and Merging Data Sets – Reshaping and Pivoting – Data Transformation – String Manipulation – USDA Food Database  UNIT-IV Plotting and Visualization Periods: 9	g
Data preprocessing: Reading and Writing Data in Text Format – Binary Data Formats – Interacting with HTML and Web APIs interacting with Databases.  Data wrangling and transformation: Combining and Merging Data Sets – Reshaping and Pivoting – Data Transformation – String Manipulation – USDA Food Database  UNIT-IV Plotting and Visualization Periods: 9  Brief matplot lib API Primer – Plotting Functions in pandas – Plotting Maps: Visualizing Haiti Earthquake Crisis Data – Python	g
Data preprocessing: Reading and Writing Data in Text Format – Binary Data Formats – Interacting with HTML and Web APIs interacting with Databases.  Data wrangling and transformation: Combining and Merging Data Sets – Reshaping and Pivoting – Data Transformation – String Manipulation – USDA Food Database  UNIT-IV Plotting and Visualization Periods: 9  A Brief matplot lib API Primer – Plotting Functions in pandas – Plotting Maps: Visualizing Haiti Earthquake Crisis Data – Pythomic Visualization Tool Ecosystem.	g
Data preprocessing: Reading and Writing Data in Text Format – Binary Data Formats – Interacting with HTML and Web APIs interacting with Databases.  Data wrangling and transformation: Combining and Merging Data Sets – Reshaping and Pivoting – Data Transformation – String Manipulation – USDA Food Database  UNIT-IV Plotting and Visualization Periods: 9  A Brief matplot lib API Primer – Plotting Functions in pandas – Plotting Maps: Visualizing Haiti Earthquake Crisis Data – Pythomy Visualization Tool Ecosystem.  UNIT-V Data Aggregation, Group Operations and Time Series Periods: 9	n CO4
Data preprocessing: Reading and Writing Data in Text Format – Binary Data Formats – Interacting with HTML and Web APIs interacting with Databases.  Data wrangling and transformation: Combining and Merging Data Sets – Reshaping and Pivoting – Data Transformation – String Manipulation – USDA Food Database  UNIT-IV Plotting and Visualization Periods: 9  Data Brief matplot lib API Primer – Plotting Functions in pandas – Plotting Maps: Visualizing Haiti Earthquake Crisis Data – Pythologicalization Tool Ecosystem.  UNIT-V Data Aggregation, Group Operations and Time Series Periods: 9  Data aggregation and group operations: GroupBy Mechanics – Data Aggregation – Group-wise Operations and Transformations	G CO4
Data preprocessing: Reading and Writing Data in Text Format – Binary Data Formats – Interacting with HTML and Web APIs interacting with Databases.  Data wrangling and transformation: Combining and Merging Data Sets – Reshaping and Pivoting – Data Transformation – String Manipulation – USDA Food Database  UNIT-IV Plotting and Visualization  A Brief matplot lib API Primer – Plotting Functions in pandas – Plotting Maps: Visualizing Haiti Earthquake Crisis Data – Pythody Visualization Tool Ecosystem.  UNIT-V Data Aggregation, Group Operations and Time Series  Data aggregation and group operations: GroupBy Mechanics – Data Aggregation – Group-wise Operations and Transformations Divot Tables and Cross-Tabulation.  Time series: Date and Time Data Types and Tools – Time Series Basics – Date Ranges, Frequencies, and Shifting – Time Zon	CO4
Data preprocessing: Reading and Writing Data in Text Format – Binary Data Formats – Interacting with HTML and Web APIs interacting with Databases.  Data wrangling and transformation: Combining and Merging Data Sets – Reshaping and Pivoting – Data Transformation – String Manipulation – USDA Food Database  UNIT-IV Plotting and Visualization  Brief matplot lib API Primer – Plotting Functions in pandas – Plotting Maps: Visualizing Haiti Earthquake Crisis Data – Pythocy is a great and Tool Ecosystem.  UNIT-V Data Aggregation, Group Operations and Time Series  Periods: 9  Data aggregation and group operations: GroupBy Mechanics – Data Aggregation – Group-wise Operations and Transformations in the Series and Cross-Tabulation.  Divot Tables and Cross-Tabulation.  Divot Tables and Time Data Types and Tools – Time Series Basics – Date Ranges, Frequencies, and Shifting – Time Zon Handling – Periods and Period Arithmetic – Resampling and Frequency Conversion – Time Series Plotting – Moving Windows Mindows Private Primary Plansforms (Proposition – Time Series Plotting – Moving Windows)	CO5
Data preprocessing: Reading and Writing Data in Text Format – Binary Data Formats – Interacting with HTML and Web APIs interacting with Databases.  Data wrangling and transformation: Combining and Merging Data Sets – Reshaping and Pivoting – Data Transformation – String Manipulation – USDA Food Database  UNIT-IV Plotting and Visualization Periods: 9  Data Brief matplot lib API Primer – Plotting Functions in pandas – Plotting Maps: Visualizing Haiti Earthquake Crisis Data – Pythomalization Tool Ecosystem.  UNIT-V Data Aggregation, Group Operations and Time Series Periods: 9  Data aggregation and group operations: GroupBy Mechanics – Data Aggregation – Group-wise Operations and Transformations are series: Date and Time Data Types and Tools – Time Series Basics – Date Ranges, Frequencies, and Shifting – Time Zon landling – Periods and Period Arithmetic – Resampling and Frequency Conversion – Time Series Plotting – Moving Window unctions – Performance and Memory Usage Notes.	CO4
Pata preprocessing: Reading and Writing Data in Text Format – Binary Data Formats – Interacting with HTML and Web APIs Interacting with Databases.  Pata wrangling and transformation: Combining and Merging Data Sets – Reshaping and Pivoting – Data Transformation – String Manipulation – USDA Food Database  UNIT-IV Plotting and Visualization Periods: 9  Brief matplot lib API Primer – Plotting Functions in pandas – Plotting Maps: Visualizing Haiti Earthquake Crisis Data – Pythor Visualization Tool Ecosystem.  UNIT-V Data Aggregation, Group Operations and Time Series Periods: 9  Pata aggregation and group operations: GroupBy Mechanics – Data Aggregation – Group-wise Operations and Transformations Privot Tables and Cross-Tabulation.  Bine series: Date and Time Data Types and Tools – Time Series Basics – Date Ranges, Frequencies, and Shifting – Time Zon Landling – Periods and Period Arithmetic – Resampling and Frequency Conversion – Time Series Plotting – Moving Window unctions – Performance and Memory Usage Notes.  Lecture Periods: 45 Tutorial Periods: - Practical Periods: - Total Periods	COS
Data preprocessing: Reading and Writing Data in Text Format – Binary Data Formats – Interacting with HTML and Web APIs interacting with Databases.  Data wrangling and transformation: Combining and Merging Data Sets – Reshaping and Pivoting – Data Transformation – String Manipulation – USDA Food Database  UNIT-IV Plotting and Visualization  Brief matplot lib API Primer – Plotting Functions in pandas – Plotting Maps: Visualizing Haiti Earthquake Crisis Data – Pythomalization Tool Ecosystem.  UNIT-V Data Aggregation, Group Operations and Time Series Periods: 9  Data aggregation and group operations: GroupBy Mechanics – Data Aggregation – Group-wise Operations and Transformations in the series: Date and Time Data Types and Tools – Time Series Basics – Date Ranges, Frequencies, and Shifting – Time Zonal and Image – Periods and Period Arithmetic – Resampling and Frequency Conversion – Time Series Plotting – Moving Windown – Performance and Memory Usage Notes.  Lecture Periods: 45 Tutorial Periods: - Practical Periods: - Total Periods Fext Books  1. William McKinney, "Python for Data Analysis – Data Wrangling with Pandas, NumPy and IPython", O'Reilly, 2	CO4
Data preprocessing: Reading and Writing Data in Text Format – Binary Data Formats – Interacting with HTML and Web APIs interacting with Databases.  Data wrangling and transformation: Combining and Merging Data Sets – Reshaping and Pivoting – Data Transformation – String Manipulation – USDA Food Database  UNIT-IV Plotting and Visualization  A Brief matplot lib API Primer – Plotting Functions in pandas – Plotting Maps: Visualizing Haiti Earthquake Crisis Data – Pythody Visualization Tool Ecosystem.  UNIT-V Data Aggregation, Group Operations and Time Series Periods: 9  Data aggregation and group operations: GroupBy Mechanics – Data Aggregation – Group-wise Operations and Transformations Privot Tables and Cross-Tabulation.  Time series: Date and Time Data Types and Tools – Time Series Basics – Date Ranges, Frequencies, and Shifting – Time Zondandling – Periods and Period Arithmetic – Resampling and Frequency Conversion – Time Series Plotting – Moving Windows – Performance and Memory Usage Notes.  Lecture Periods: 45  Tutorial Periods: - Practical Periods: - Total Periods  Text Books	CO4

#### Reference Books

- John Paul Mueller, Luca Massaron, "Python for Data Science for Dummies", John Wiley& Sons, 2<sup>nd</sup> edition, 2019. Jesus Rogel-Salazar, "Data Science and Analytics with Python", CRC Press Taylor and Francis Group, 1<sup>st</sup> edition,

- Mark Lutz, Laura Lewin, Frank Willison, "Programming Python", O'Reilly Media, 3<sup>rd</sup> edition, 2006. Eric Matthes, "Python Crash Course: A Hands-on, Project-based Introduction to Programming", 2<sup>nd</sup> edition, 2019. Al Sweigart, "Automate the Boring Stuff with Python: Practical Programming for Total Beginners", 1<sup>st</sup> edition, 2015.

- 1. https://nptel.ac.in/courses/106/106/106106212/
- 2. https://www.geeksforgeeks.org/data-analysis-visualization-python/
- 3. https://www.coursera.org/learn/python-data-analysis
- 4. https://www.python.org/
- 5. https://www.datacamp.com/courses/statistical-thinking-in-python-part-1

### COs/POs/PSOs Mapping

COs		Progra	m Out			ram Spe omes (P			
PL 195	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	2	2	1 ,	2	2	3	2	2
2	1	2	2	2	2	2	3	2	2
3	2	3	3	1	3	3	3	3	3
4	2	3	3	1	3	3	3	3	3
5	2	3	3	1	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

ſ	Assessment	47	Continu	ous Asse	essment Marks(	CAM)	End Semester	Total
1		CAT 1	CAT 2	Model	Assignment*	Attendance	Examination(ESE)	Marks
	1 - 301 N - 61 - 11		r*	Exam		1 0 0	Marks	
	Marks	1	0	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	Artinic	ial Intelligence and Data Science	Program	IIIIC. IVI.	recn.					
Semester	I		Course (	Categor	y: PE	End S	Semester	Exam Typ	e: TE	
Course Code	D23 A I	P23ADE102         Periods / Week         Credit         Maximum           L         T         P         C         CAM         ESE           Data Science Essentials         3         40         60								
Course Code	FZJAI	DE 102	L	Т	Р	С	CAM	ESE	TM	
Course Name	Data 9	Science Essentials	3		RONG N	3	40	60	100	
	<u> </u>	[ ] " _ "alore veries temper (	AI &DS)	ioudiv s	relaine.	purhas reso;	- Jook vee	i i i i i i i i i i i i i i i i i i i	di ma	
Prerequisite			25 E 2 E					- Arrans	7/ -	
	On con	npletion of the course, the student	ts will be	able to				BTM	1apping	
Course								(Highe	est Level	
Outcomes	CO1 Understand the data science process and how its components interact								K3	
	CO2 Classify, formulate the data science problems and manage large dataset							e la seria de	K3	
	CO3	Plan modeling, apply basic machin							K2	
	CO4	Create effective visualization of date							K3	
	COF	Lieu de			-6 -11:		, ,			
	CO5	Use the data science toolkit and de science	evelop aw	areness	or etnic	ai dimensio	ons of da	ta	K3	
UNIT-I	Introd	uction		2707		Periods: 9				
troduction: Data	Science	- Key Features - Motivations - Relations	hip betwee	n Artific	ial Intellig	ence, Machir	ne Learnir	ng, and Dat	а	
		a Science Classification - Data Science A	pplications	AC 144		Poriodo: 0	ta t	ř		
UNIT-II Data Exploration:	<b>Data N</b> Objective	Management s - Datasets - Descriptive Statistics - Dat	a Visualiza	ition – D	ata Collec	Periods: 9	ources - R	Reading File	s CO	
UNIT-II Data Exploration: Scraping the W	Data Nobjective	Management s - Datasets - Descriptive Statistics - Dat ng APIs – Working with Data: Explorin	a Visualiza g Your Da	ition – D	ata Collectaning an	ction: Data So	Manipula	ating Data	4	
UNIT-II Pata Exploration: Scraping the W Rescaling - Dimer	Data Nobjective leb - Usinsionality	Management s - Datasets - Descriptive Statistics - Dat	a Visualiza g Your Da ms of hand	ition – Di ita - Cle	ata Collect aning an e data –	ction: Data So	Manipula	ating Data	4	
UNIT-II ata Exploration: Scraping the W escaling - Dimer or handling large	Data Nobjective leb - Using the property of th	Management s - Datasets - Descriptive Statistics - Dat ng APIs – Working with Data: Explorin Reduction – Data Handling: The proble of data - Distributing data storage and pre	a Visualiza g Your Da ms of hand	ition – Di ita - Cle	ata Collect eaning and e data – eworks.	ction: Data So d Munging - Techniques	Manipula	ating Data	4	
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- 4. https://monkeylearn.com/text-analysis/
- 5. https://www.toptal.com/designers/data-visualization/data-visualization-tools

### COs/POs/PSOs Mapping

COs		Progra	m Out		Program Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO6	PSO1	PSO2	PSO3		
1	2	3	2	a •	E - 16	n. <del>.</del> a	9 3 1 3 9	2	1/1/5
2	3	3	3	- ·	1	1,7 <del>-</del>	2	2	1
3	2	3	2	1	2	. E je	2	2	1
4	3	3	3	1 .	3	-	2	2	1
5	3	3	3	1	3	-	2	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment		Continu	ous Asse	essment Marks	(CAM)	End Semester	Total
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	1	0	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	Artific	ial Intelligence and Data Science	Progran	nme: <b>M.</b>	Tech.				
Semester	I		Course			End	Semester	Exam Type	: TE
Course Code	P23AI	DE103	Pe	riods / V	Veek	Credit	P. Williams	Maximum I	
			L	T.	Р	C	CAM	ESE	TM
Course Name	Big D	ata Mining and Analytics	3			3	40	60	100
	1.117.4		AI &DS)	-petili		et myarkada	in Mila	arithighter	perten
Prerequisite	is = fores, string						- I		
Cale Bayagazeliasi	On cor	mpletion of the course, the studen	ts will be	able to				BT Ma	apping
									10 - 17
Course Outcomes	CO1	Explore the fundamental concepts	pts of big data and analytics.						t Level)
- Cutoomoo	CO2	To learn Hadoop and develop map							
	CO3	Design algorithms for handling pet						K	
	CO4	Design algorithms and propose so				timizina ma	in momo	K	
		consumption	iddolla 10	i big ba	ita by op	timizing ma	iii iiieiiioi	ry <b>K</b>	3
	CO5	Analyse a data in modeling						K	3
UNIT-I	UNIT-I Introduction To Big Data and Analytic uction to Big Data Platform – Importance of Big data – Big					Periods: 9			
the practice in ana	lytics rol	atform – Importance of Big data – Big da e of data scientists - Key roles for succes Data Analytics applications	ta sources ssful analy	– Acqui tic projec	sition, Big ct - Main p	data Busine chases of life	ess Analyti cycle - Be	cs - State of est Practices	CO
UNIT-II	HADO			***************************************		Periods: 9	missi ve	rae ravši	<del></del>
History of Hadoop	- Hadoo	op Distributed File System – Component n of HDFS-Java interfaces to HDFS Basi	s of Hado	op - Ana	lyzing the	Data with H	ladoop - S	caling Out -	CO
UNIT-III Nearest Neighbor - Distance Measur	Search -	ar Items Search - Shingling of Documents – Similarity pre eory of Locality Sensitive Functions – LSF	eserving su I Families	ımmaries – Method	– Locali	Periods: 9 ty sensitive h h Degree of	nashing for Similarities	documents	co:
UNIT-IV	Minin	g Data Streams		<del></del>		Periods: 9		l	
		pling Data in the Stream - Filtering Stre	eams – Co	ounting D			a Stream -	- Estimating	CO
Moments – Countir	ng Ones	in Window - Decaying Windows		, -					00-
UNIT-V	Predic	ctive Analytics				Periods: 9		I	
Predictive Analytics	s- Simple	e linear regression- Multiple linear regres	sions - Inte	erpretation			cients. Vis	ualizations -	
		ques- interaction techniques - Systems ar	nd applicat	ions					COS
Lecture Pe	eriods:	30 Tutorial Periods: 15	Pra	actical I	Periods:	-	Tota	l Periods:	15
Text Books								The state of the s	
Enterpris 2. ure Lesk Edition, 2	e Class ovec, A 2014. an, Mic	rk DeRoos, Tom Deutsch, George Hadoop and Streaming Data", McGr nand Rajaraman, Jeffrey David Ullma heline amber, Jian Pei, "Data Minin	aw-Hill P an, "Minin	ublishing g of Ma	g, 2012. Issive Da	atasets", Ca	mbridge	University P	ress, 2
Reference Book			***************************************					***************************************	
1. Ian H.W	itten, E	ibe Frank "Data Mining – Practica Edition, 2016.	al Machin	e Learr	ning Too	ols and Te	chniques'	', Morgan	Kaufma
<ol> <li>Arshdeer</li> <li>Michael I</li> </ol>	o Bahga Minelli,	ı, Vijay Madisetti, "Big Data Science & Michehe Chambers, "Big Data, Big A s", 1st edition, Ambiga Dhiraj, Wiely (	Analytics:	Emergi	ng Busir	Approach ", ness Intellig	VPT, 1st ence and	edition, 201 Analytic Ti	8. rends f
4. Viktor Ma Think, 1s	ayer-Scl	hönberger and Kenneth Cukier, Big	kier, Big Data: A Revolution That Will Transform How We Live, Wo				lork, ar		
		pop: The Definitive Guide, 4 <sup>th</sup> edition,	e, 4 <sup>th</sup> edition, 2015.						

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- 2. https://www.techopedia.com/definition/30215/big-data-mining
- 3. https://www.techtarget.com/searchbusinessanalytics/definition/data-mining
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- 5. https://www.ibm.com/topics/predictive-analytics

#### COs/POs/PSOs Mapping

COs	- · .	Progra	m Out	comes	(POs			ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	3	2	424		4744	ma 1	2	141
2	3	3	3	-	1	-	2	2	1
3	2	3	2	- 1	2	-	2	2	1
4	3	3	3	1	3	- ,	2	2	1
5	3	3	3	1	3	u. 1-7.	2	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment		Continu	ous Asse	ssment Marks (	CAM)	End Semester	Total
Enthouse the	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	1	0	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	Artificial Intelligence and Data Science	Program	me. w.	recn.				
Semester		Course (	Categor	y: PE	End S	Semester	Exam Typ	e: TE
Course Code	D22ADE404	Per	iods / W	/eek	Credit	100-10	Maximum	
Course Code	P23ADE104	L	ΤÏ	Р	С	CAM	ESE	TM
Course Name	Artificial Intelligence for Decision Making	3	-	-	3	40	60	100
		AI &DS)				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	<u> </u>	
Prerequisite	anguna perana minus at angenti re	eralla dell'	jarangu.	je sp	Lagrania de	E MEG-A	ari kajin	(9) -8
	On completion of the course, the studen	ts will be	able to				BTN	apping
Course				1 40			(Highe	st Level
Outcomes	CO1 Understand the concepts of Expert s	systems.				5 IS 55 - AY	- ingilang	K2
	CO2 Acquire knowledge on Knowledge re	epresentati	on tech	niques.	sant-Tidas,-	17.79.4517	u szywina	K3
	CO3 Explore the Inference methods.					E1 - 7 E 7		K3
	CO4 Explore and Analyze the Reasoning	under und	ertainty	E I may be a s	did Latina m			K2
			Citalinty	. v = P5P.	of Westington		1 SA-VE 1 7.01	<b>N</b> 2
	CO5 Demonstrate the design of expert sy	stem.				-243	- <u>1945 n</u> a	K3
UNIT-I	Introduction to Expert Systems  n expert system - problem domain and knowledge						ods: 9	
the developmenule-based expert	nt of an expert system - general characteristics of systems - procedural and nonprocedural paradigr	f an expert :	system -	history a	and uses of e	expert sys ems.	tems today	CO
UNIT-II	The Representation of Knowledge							
epresented - sem neir limitations - h gic – quantifiers	ic - difference between formal logic and informal nantic nets - how to translate semantic nets into Form to use logic and set symbols to represent known indicate logic in imitations of propositional and predicate logic.	PROLOG - I	imitation	s of sema	antic nets - s	w knowle schemas nd first ord	- frames and der predicat	d
epresented - sen neir limitations - h ogic – quantifiers UNIT-III rees – lattices - mitations of prop ausal reasoning	ic - difference between formal logic and information near the result of	PROLOG - I owledge - the PR trees and f inference gic - forwar	imitation ne mean d goals - - resolut d and b	s of semaing of pro	antic nets – s positional ar s of inference ms - and de chaining - a	w knowle schemas and first ord	edge can be-frames ander predicate  ods: 9  of inference shallow and methods of	d CC
epresented - senter limitations - hogic - quantifiers  UNIT-III  rees - lattices - mitations of propausal reasoning aference - Meta	ic - difference between formal logic and information near the new to translate semantic nets into F now to use logic and set symbols to represent known initiations of propositional and predicate logic.  Methods of Inference  and graphs - state and problem spaces - AND-O ositional logic - logic systems - resolution rule o	PROLOG - I owledge - the PR trees and f inference gic - forwar cision Maki	imitation ne mean d goals - - resolut d and b	s of semaing of pro	antic nets – s positional ar s of inference ms - and de chaining - a	w knowle schemas and first ord	edge can be-frames ander predicate  ods: 9  of inference shallow and methods of	d CO
epresented - sen neir limitations - h ogic – quantifiers  UNIT-III  rees – lattices - mitations of propausal reasoning neerence - Meta ystem – Role of	ic - difference between formal logic and information nantic nets - how to translate semantic nets into F now to use logic and set symbols to represent known in the proposition of the p	PROLOG - I owledge - the PR trees and f inference gic - forwar cision Maki t System.	d goals - resolut d and b	s of semaing of pro- methods ion syste packward poision Ma	antic nets — sopositional are sof inference of sof inference of the chaining — a aking using	Perio e - rules of eduction - additional ML, Decis	edge can be-frames ander predicate  ods: 9  of inference shallow and methods of sion Support  ods: 9	d CO
epresented - semeir limitations - heir limitations - heir limitations - heir limitations - heir limitations of unitations of propausal reasoning and a semented by the meaning of unitation - feature appothetical reasoning of unitation - feature appointment of the feature appointment of	Methods of Inference and graphs - state and problem spaces - AND-O ositional logic - logic systems - resolution rule o - applying resolution to first-order predicate logic knowledge - the Markov decision process - De Artificial Intelligence in Intelligent Decision Suppor  Reasoning Under Uncertainty ncertainty and theories devised to deal with it - thes of classical probability - experimental and substanting and backward induction - temporal reasoning in inference chains - implications of combining	PROLOG - It owledge - the owledge - forward cision Making the System.	d goals - resolut d and b ng – De	methods ion syste backward cision Ma uted to u - compo	antic nets — s positional ar s of inference ms - and de chaining - a aking using  ncertainty - e und and con belief - suffic	Periode - rules of additional ML, Decisional process of additional	edge can be-frames ander predicate  ods: 9  of inference shallow and methods of sion Support  ods: 9  ociate - with robabilities dinecessity	co
epresented - semer limitations - heir limitations - heir limitations - heir limitations - heir limitations of propausal reasoning a semented - Metaystem - Role of UNIT-IV he meaning of unduction - feature appothetical reason of uncertainty robabilities are purposed to the semented by the semented reason of uncertainty robabilities are purposed to the semented reason of the semented reaso	ic - difference between formal logic and information and the control of the contr	PROLOG - I owledge - the PR trees and f inference gic - forwar cision Maki t System. ypes of erro jective prot ng - Markov g evidence	d goals resolut d and b ng - De  ors attrib oabilities chains role o	methods ing of pro methods ion syste packward cision Ma  uted to u - compo - odds of of inferen	antic nets — sopositional are soft inference with a new chaining — a aking using incertainty — e und and con belief – sufficients in e	Perio	edge can be-frames ander predicate  ods: 9  of inference shallow and methods of sion Support  ods: 9  ociate - with robabilities of necessity stems - howeds: 9	d e CO
epresented - semer limitations - lagic - quantifiers  UNIT-III  rees - lattices - mitations of propausal reasoning a presented by the meaning of unduction - feature appothetical reasoning of uncertainty robabilities are publication.	ic - difference between formal logic and information and the control of the contr	PROLOG - I owledge - the owled	d goals resolut d and b ng - De  ors attrib oabilities chains role o	methods ing of pro methods ion syste packward cision Ma  uted to u - compo - odds of of inferen	antic nets — sopositional are sopositional are softened and de chaining — a aking using land and combelief – sufficience nets in experience of	Perio errors ass additional p ciency and expert sys	edge can be frames ander predicate ods: 9 of inference shallow and methods of sion Support of	d co
epresented - seme in imitations - land imitations - land imitations - land imitations - land imitations of propagation of prop	ic - difference between formal logic and informantic nets - how to translate semantic nets into Finow to use logic and set symbols to represent known to use logic and set symbols to represent known imitations of propositional and predicate logic.  Methods of Inference  and graphs - state and problem spaces - AND-O ositional logic - logic systems - resolution rule o - applying resolution to first-order predicate logic knowledge - the Markov decision process — De Artificial Intelligence in Intelligent Decision Support Reasoning Under Uncertainty  Incertainty and theories devised to deal with it - the sof classical probability - experimental and substantial and backward induction - temporal reasoning in inference chains - implications of combining repagated.  Design of Expert Systems  appropriate problem - the stages in the develo	PROLOG - I owledge - the owled	d goals resolut d and b ng - De  prs attrib pabilities chains role of	methods ing of pro methods ion syste packward cision Ma  uted to u - compo - odds of of inferen	antic nets — sopositional are sopositional are soft inference soft inference soft inference soft inference chaining — a sking using soft inference soft inference nets in each of the expected soft inference soft infer	Periode - rules of control of the co	edge can be frames ander predicate ods: 9 of inference shallow and methods of sion Support of	d co
epresented - sen leir limitations - l legic - quantifiers  UNIT-III  rees - lattices - mitations of propausal reasoning liference - Meta lystem - Role of  UNIT-IV  the meaning of unduction - feature lypothetical reasonicle of uncertaint robabilities are p  UNIT-V  ow to select an evelopment stag lystem - how to de	ic - difference between formal logic and information and the control of the contr	PROLOG - I owledge - the owled	d goals resolut d and b ng - De  prs attrib pabilities chains role of	methods ing of pro methods ion syste packward cision Ma  uted to u - compo - odds of of inferen system tems - th	antic nets — sopositional are sopositional are soft inference soft inference soft inference soft inference chaining — a sking using soft inference soft inference nets in each of the expected soft inference soft infer	Periode - rules of control of the co	edge can be frames ander predicate ods: 9 of inference shallow and methods of sion Support of	d co

#### Reference Books

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- 2. Nikolopoulos, "Expert Systems", Marcel Dekker Inc. 1997.
- H. B. Verbruggen, Spyros G. Tzafestas, "Artificial Intelligence in Industrial Decision Making, Control and Automation", Springer, 2012.
- Lakhmi C. Jain, Gloria Phillips-Wren, "Intelligent Decision Support Systems in Agent-mediated Environments", IOS Press, 2005.
- Nilanjan Dey, Jitendra Kumar Rout, Himansu Das, Suresh Chandra Moharana "Applied Intelligent Decision Making in Machine Learning", CRC Press; 1st edition, 2020.

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- 2. http://www.umsl.edu/~joshik/msis480/chapt11.htm
- 3. https://www.coursera.org/courses?query=decision%20making
- https://www.slideshare.net/akhilrocker143/572-11293384
- https://www.sciencedirect.com/science/article/abs/pii/0378720693900696

#### COs/POs/PSOs Mapping

COs		Progra	m Out	comes	(POs			ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	3	2	-	-	_	1	2	1
2	3	3	3		1		2	2	1
3	2	3	2	1	2	-	2	2	1
4	3	3	3	1	3	1	2	2	1
5	3	3	3	1,	3	-	2	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment		Continu	ous Asse	essment Marks (	(CAM)	<b>End Semester</b>	Total
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	1	0	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	Computer Science Engineering (Big Data Analytics)	Progran	nme: M	l.Tech.				
Semester	They will supplie to the said subset of the	Course	Catego	ory : PE	End Se	mester E	xam Type:	TE
Course Code	P23BDEC02	Pe	riods /	Week	Credit	N	/laximum l	Marks
		L L	T	P	C	CAM	ESE	TN
Course Name	Web Analytics and Development	3			3	40	60	100
	(Common to M.Tech	CSE(BDA	and A	d and DS)			e gride	
Prerequisite	Internet Programming							
	On completion of the course, the studen						BT Ma (Highest	Leve
Course	CO1 Understand the Web analytics platform, CO2 Use the various Data Streams Data.	and their e	volution				K	
Outcomes		30.0					K	20.10
	CO3 Know how the survey of capturing of dat			6 _ 7	k - '		K	
	CO4 Understand Common metrics of web as		I related	d concepts.			K	
	CO5 Apply various Web analytics versions in	existence.	10,500				K	3
UNIT – I	Introduction ess, Key terms: Site references, Keywords and K				Periods:9			CO
analyticsevolutic UNIT – II Click stream Da Brand/Advocacy	terization terms, Conversion metrics; Categories, Need for web analytics, Advantages, Limitation Data Collection  ta: Web logs, Web Beacons, JavaScript tags, Fand Support; Research data: Mindset, Organical Control of the Control of	ons Packet Sniff	ing; Ou	tcomes Da	Periods:9 ta: Ecomme	erce, Lead	generation	, CO2
measurement, IS	SP-based measurement, Search Engine data.  Qualitative Analysis	1877.365			Periods:9			
Capturing data: Integration, sele- Using cookies, L	visits; Surveys: Website surveys, post-visit su Web logs or JavaScript's tags, Separate data cting optimal web analytic tool, Understanding ink coding issues. Web Metrics	serving and	d data	capture, Ty ta quality, i	pe and size	of data,	<b>Innovation</b>	
Common metrics on site, new vi campaigns; Rea Introduction to K Client / Server C	s: Hits, Page views, Visits, Unique visitors, Unique sits; Optimization (e-commerce, non-e-commerce), I time report, Audience report, Traffic source of the computing, HTTP (Hypertext Transfer Protocol), Web Analytics 2.0	erce sites; eport, Cus f KPI, Uses	: Impro tom car of KPI	unce, Boun oving boun mpaigns, C . Relevant Cookies, V	ce rate, Pag ce rates, C content repo Technologie	Optimizing ort, Google	Ad Words analytics	5
Veb analytics 1.0 oolbar data, Par ends Analyzing enchmarking Ca	, Limitations of web analytics 1.0, Introduction to nel data, ISP data, Search engine data, Hybri competitive site overlap and opportunities. C ategories of traffic: Organic traffic, Paid traf rmance concerns, Privacy issues.	id data, Wo Google Ana fic; Google	ebsite t alytics: e websi	petitive inte raffic analy Brie introd	lligence ana vsis: Compa uction and er, Implem	aring long working, entation	term traffic Ad Words technology	
ext Books	rutorial renous: -	l Pr	actical	renous:		rotal	Periods:	40
.Clifton B., Adva .Jure Leskovec, 014 .Kaushik A., We	nced Web Metrics with Google Analytics, Wiley Anand Rajaraman, and Jeffrey D. Ullman , "M b Analytics 2.0, The Art of Online Accountabil	ining of Ma	assive [	Datasets" 2	nd edition,	•		ev.
010 References Bo	oks		***************************************					•
l. Brian Clifton , "/ J. Jerri L. Ledford Pedro Sostre ,"We	b Metrics: Proven methods for measuring web sit Advanced Web Metrics with Google Analytics", 3 and Joe Teixeira, "Learning Web Analytics: A B bb Analytics For Dummies", For Dummies, Seco k, "Web Analytics 2.0: The Art of Online Accoun	Sybex, Third deginner's Country and Edition	d Edition Suide to , 2012	n, 2012 Google An	alytics", O'F			200

- 1. https://www.mygreatlearning.com/courses/big-data-analytics-dse
- 2. https://intellipaat.com/big-data-hadoop-training/
- 3. https://www.edureka.co/comprehensive-hive

### COs/POs/PSOs Mapping

COs		Progra	m Out	comes	(POs			ram Spe omes (P	
P80	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	3	3	2	1		ere ere		1	3
2	3	3	2	1	= 21.4	1000	, -1-a-45° ±	1	3
3	3	3	2	1	190		274_0 30	1	3
4	3	3	2	+1	77 Bir 4	Operation		1	3
5	3	3	2	- 1	1 1	81711	Yane -	1	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

, e/d 57		Contin	uous Ass	sessment Mark	s (CAM)	End	
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Semester Examination (ESE) Marks	Total Marks
Marks	1	0	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Semester	1	al Intelligence and Data Science	<u> </u>	nme: <b>M.</b>	·				
	11		-	Categor			Semeste	r Exam Typ	
Course Code	P23AD	E205	Pe	riods / W		Credit	1128 12	Maximum	Marks
Comment Name	D-4- V		L	T	Р	С	CAM	ESE	TM
Course Name	Data v	isualization Using Power BI	3	-	ar = y2 2- 1.3	3	40	60	100
	1	and the second s	AI &DS)	Lub tekt	Right supp	4365,000		and lightly	1,
Prerequisite	- \								
		npletion of the course, the studen		able to			7.0 12 60		lapping est Level
Course Outcomes	C01	Apply the various Charts using Tal	oleau.					i a ha	K3
Outcomes	CO2	Understand and apply Maps in Tal	oleau.	Ser Tel	4 1,3				K3
	CO3	Understand the Power BI concepts	3						K2
	CO4	Apply the Power Querry and M Lai	nguage in	data.					K3
	CO5	Design the concepts in data model	lling and	reate a	dashboa	ırd.			K3
UNIT-I	<u> </u>	uction in Tableau	9			Periods: 9			
orting the graphs ggregate Measur	s – Histo res. Crea lettes – l	Products- Connecting to data source — grams — Line Charts — Using the Sho ting Bivariate Charts: Tables — Scatter Jsing dates. Creating Multivariate Chart	w Me too Plots – S	bar – Sta wapping	acked Ba Rows an	ar Graphs – d Columns -	Box Plot - Adding	s – Showin trend lines	g cc
UNIT-II	Maps	and Statistics using Tableau		***************************************		Periods: 9	7.70		i
ashboards – Crea UNIT-III onnection of Dat esktop-Flow of W	Introd a Source	uction to Power Bi  - Reporting Business Intelligence (BI), wer BI Desktop-Power BI Architecture-A	Traditiona	al BI, Sel	f-Service	Periods: 9	BI Produ	cts_Power B	
271 1		wel bi besklop-rowel bi Alcillectule-A	A Brief Hist	ory of Po	wer BI.			cis-i owei L	1
UNIT-IV	Power	Querry And M Language				Periods: 9			CO
UNIT-IV Pata Transformation Query Editor, Query Editor, Query Editor, Query Editor, Grandition and GROUP BY O	Power on, Bene y Editor ns, Trans ptions Ta	Querry And M Language fits of Data Transformation-Shape or To User Interface- The Ribbon (Home, Transform Column () Types-Remove Column IbleGroup () Table. Sort () with Type Co	ransform [ nsform, Ad s (), Split	Data using d Column Columns	g Power I, View Ta (),Replace	Periods: 9 Query-Overvabs)-Basic Free Value() -1	riew of Pounctions-I	ower Query M Language	CO / CO
UNIT-IV Data Transformation Query Editor, Query Editor, Query Editor, Query Editor, Query Enclose Condition	Power on, Bene by Editor ns, Trans ptions Ta with M La	Querry And M Language fits of Data Transformation-Shape or To User Interface- The Ribbon (Home, Transform Column () Types-Remove Column IbleGroup () Table. Sort () with Type Co	ransform [ nsform, Ad s (), Split	Data using d Column Columns	Power  Note: View Tale	Periods: 9 Query-Overvabs)-Basic Free Value() -1	riew of Pounctions-I	ower Query M Language	CO / CO
UNIT-IV Data Transformation Query Editor, Query Editor, Query Editor, Query Editor, Query Editor of GROUP BY Obling Parameters UNIT-V Data Modeling In One, One-to-Maixisting relations Dashboards.	Power on, Bene ry Editor ns, Trans ptions Ta with M La Data M troduction ny (or M ships -M	r Querry And M Language  fits of Data Transformation-Shape or Transform (Home, Transform Column (Home, Transform Column)  John -Relationship, Need of Relationship (Home, Transform Column)  Jany-to-One), Many-to-Many - Autolake Relationship Active or Inactive	ransform Ensform, Ads (), Split Conversion  hip*-Relation Detect the -Delete	Data using d Column Columns s PIVOT onship T e relatio	Power Taylor Tay	Periods: 9 Query-Overvabs)-Basic Free Value() -1 on and Table. Periods: 9 Cardinality in Create a nee	riew of Pounctions-I Fable. Dis Pivot()-L n Genera w relation	ower Query M Language stinct Option ist Function al & One-to onship, Edi e- Creating	CO
UNIT-IV Pata Transformation Query Editor, Query Editor, Query Editor, Query Editor, Query Editor of GROUP BY Open Parameters UNIT-V Pata Modeling In One, One-to-Maixisting relations pashboards.	Power on, Bene ry Editor ns, Trans ptions Ta with M La Data M troduction ny (or M ships -M	Querry And M Language fits of Data Transformation-Shape or To User Interface- The Ribbon (Home, Transform Column () Types-Remove Column IbleGroup () Table. Sort () with Type Conguage Modeling on -Relationship, Need of Relationsh Many-to-One), Many-to-Many - Auto	ransform [ nsform, Ad s (), Split conversion nip*-Relati	Data using d Column Columns s PIVOT onship T e relatio	Power Taylor Tay	Periods: 9 Query-Overvabs)-Basic Free Value() -1 on and Table. Periods: 9 Cardinality in Create a nee	view of Pounctions-I Fable. Dis Pivot()-L Discourse of Pivot Discourse of Discourse of Pivot Discourse of Discourse of Discourse of Discourse of D	ower Query M Language stinct Option ist Function al & One-to onship, Edi e- Creating	CO
unit-iv ata Transformatic uery Editor, Quer E.ELSE Condition of GROUP BY O sing Parameters UNIT-V lata Modeling In one, One-to-Mai existing relations lashboards. ecture Periods ext Books  1. Ashutos 2. Brett Pov edition, 2	Power on, Bene ry Editor ns, Trans ptions Ta with M La Data M troduction ry (or M ships -M : 30  h Nand well, Mas	r Querry And M Language fits of Data Transformation-Shape or To User Interface- The Ribbon (Home, Transform Column () Types-Remove Column IbleGroup () Table. Sort () with Type Conguage Modeling on -Relationship, Need of Relationsh Itany-to-One), Many-to-Many - Auto Itake Relationship Active or Inactive  Tutorial Periods: 15  eshwar, "Tableau Data Visualizat Stering Microsoft Power BI: Expert to	ransform Ensform, Ad s (), Split Conversion  hip*-Relation Detect the -Delete  Practication Coolechniques	Data using d Columns Columns S PIVOT Conship To e relation a relation a relation (kbook", for effective for effect	g Power I, View Ta (),Replace Operation  ypes , Conship, Conship  ds: -  Packt Fective dat	Periods: 9 Query-Overvabs)-Basic Five Value() -7 on and Table. Periods: 9 Cardinality in Create a nee — Power E	riew of Pounctions-I Fable. Dis Pivot()-L n General w relation of service tal Perion	ower Query M Language stinct Option ist Function al & One-to onship, Edi e- Creating ods: 45	CO
UNIT-IV ata Transformation ate T	Power on, Bene y Editor ns, Trans ptions Ta with M La Data M troduction ny (or M ships -M : 30  h Nand well, Mas 2018. Ferrari ar	r Querry And M Language fits of Data Transformation-Shape or Ti User Interface- The Ribbon (Home, Transform Column () Types-Remove Column IbleGroup () Table. Sort () with Type Conguage Modeling on -Relationship, Need of Relationsh Itany-to-One), Many-to-Many - Auto Itake Relationship Active or Inactiv  Tutorial Periods: 15  eshwar, "Tableau Data Visualiza"	ransform Ensform, Ad s (), Split Conversion  hip*-Relation Detect the -Delete  Practication Coolechniques	Data using d Columns Columns S PIVOT Conship To e relation a relation a relation (kbook", for effective for effect	g Power I, View Ta (),Replace Operation  ypes , Conship, Conship  ds: -  Packt Fective dat	Periods: 9 Query-Overvabs)-Basic Five Value() -7 on and Table. Periods: 9 Cardinality in Create a nee — Power E	riew of Pounctions-I Fable. Dis Pivot()-L n General w relation of service tal Perion	ower Query M Language stinct Option ist Function al & One-to onship, Edi e- Creating ods: 45	CO / CO
UNIT-IV Data Transformatic Query Editor, Query EELSE Condition INT-V Data Modeling In One, One-to-Man Existing relations Dashboards. Lecture Periods Ext Books  1. Ashutos 2. Brett Powedition, 2 3. Alberto F Reference Book  1. Scott Mu 2. Cole Nus 2015. 3. Stephen	Power on, Bene ry Editor ns, Trans ptions Ta with M La Data N troduction ny (or N ships -M : 30  h Nand vell, Mas cons rray, Intessbaume Few, Inf	r Querry And M Language fits of Data Transformation-Shape or To User Interface- The Ribbon (Home, Transform Column () Types-Remove Column IbleGroup () Table. Sort () with Type Conguage Modeling on -Relationship, Need of Relationsh Itany-to-One), Many-to-Many - Auto Itake Relationship Active or Inactive  Tutorial Periods: 15  eshwar, "Tableau Data Visualizat Stering Microsoft Power BI: Expert to	ransform Ensform, Ads (), Split Conversion  hip*-Relation Detect the -Delete Practication Coolechniques h Power Ensemble Constant of the Ensemble	Data using d Columns of Columns on Ship Toler relation a relation of Columns on Ship Toler a relation of Columns on Ship Toler of Columns on Ship Toler of Columns on Ship Toler of Columns	g Power I, View Ta (),Replace Operation  Types , Counship, Counship  Is: -  Packt Foctive date Dower Pive In to Desen Guide  Glance	Periods: 9 Query-Overvabs)-Basic Free Value() -7 on and Table. Periods: 9 Cardinality in Create a nee – Power Errower	riew of Pounctions-I Fable. Dis Pivot()-L In General w relation Si service tal Perion tal Perion tal Perion tal Perion tal Perion tal Perion and busin , 1st edit	ower Query M Language stinct Option ist Function al & One-to onship, Edi e- Creating ods: 45  13. iness intelli ion, 2017. edition, 2017.	CC / CC

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- 3. https://www.datacamp.com/tutorial/data-visualisation-powerbi
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- 5. https://www.tutorialspoint.com/power\_bi/power\_bi\_data\_modeling.html

### COs/POs/PSOs Mapping

COs		Progra	m Out	comes	(POs	rat er		ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	P06	PSO1	PSO2	PSO3
1	2	3	2		T	i je	1	2	1
2	3	3	3	0,00	1	PAS V	2	2	1
3	2	3	2	1	2	- I_1-9	2	2	1
4	3	3	3	1	3	-	2	2	1
5	3	3	3	1	3	-	2	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment		Continu	ious Asse	essment Marks	(CAM)	End Semester	Total
	CAT 1	CAT 2	Model	Assignment*	Attendance	Examination (ESE)	Marks
ever lates by the en-			Exam		in the second	Marks	anthyl-
Marks	1	0	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	Artificial Intelligence and Data Science	Program	me: <b>M.</b>	Tech				
Semester		Course	Categor	y: PE	*End	Semeste	r Exam Ty	pe: TE
Course Code	P23ADE206	Per	iods / V	Veek	Credit		Maximum	Marks
		L	T	Р	С	CAM	ESE	TM
Course Name	Predictive Modelling	3		F 25- <b>2</b> 71 -	3	40	60	100
		AI &DS)			Texts 1974 Pays ser		Las victorias	Lange Chay
Prerequisite	NIL					1		
	On completion of the course, the student	ts will be	able to				BT N	lapping
		3.0						st Level
Course Outcomes	CO1 Design and analyze appropriate pred	dictive mo	dels					K3
Outcomes	CO2 Define the predictive models using P	MML.			المراكرة			K3
	CO3 Apply statistical tools for analysis.					· · · · · · · · · · · · · · · · · · ·		K3
	CO4 Use various analytical tools available	e for predi	ctive mo	deling.				K3
	CO5 Apply predictive modeling markup la	nguage in	data m	anipulati	on			K3
UNIT-I	Introduction To Predictive Modeling				Periods: 9			
ore ideas in data	a mining - Supervised and unsupervised learning	- Classific	ation vs.	Prediction	n - Steps ir	data mini	ing- SEMM	Δ
proach - Sampl predictive anal	ing -Pre-processing - Data cleaning - Data Partition	oning - Bui	ding a m	nodel - St	atistical mod	lels - Statis	stical model	s CO1
UNIT-II	Predictive Modeling Basics		***************************************	I	Periods: 9		a sa sacti	
ata splitting – Ba	lancing- Over fitting -Oversampling -Multiple Reg	ression Ar	tificial ne	ural netw	orks (MLP) -	Variable i	mportance-	CO2
officioss/prior pro	obabilities - Model specification - Model selection	- Multivaria	te Analys	SIS				
UNIT-III	Predictive Models							
sociation Rules	-Clustering Models -Decision Trees- Ruleset M	odels- KN & Regress	earest N	eighbors	Periods: 9  - Naive Ba - Logistic	yes - Neu Regressio	ıral Networ	
ssociation Rules odel – Regression near Regression sessment of a s UNIT-IV roduction to PM	Clustering Models –Decision Trees- Ruleset Mon Models –Regression Trees – Classification of Scorecards – Support Vector Machines – Tiningle model.  Predictive Modeling Markup Language  ML – PMML Converter - PMML Structure – Data I	& Regressine Series	on Tree Models	eighbors s (CART) - Compa	<ul><li>Naive Ba</li><li>Logistic</li><li>rison between</li></ul> Periods: 9	Regressio en models	n – Multipl - Lift cha	e CO3
ssociation Rules odel – Regression near Regression sessment of a s UNIT-IV roduction to PM	-Clustering Models –Decision Trees- Ruleset Mon Models –Regression Trees – Classification of Scorecards – Support Vector Machines – Tiningle model.  Predictive Modeling Markup Language	& Regressine Series	on Tree Models	eighbors s (CART) - Compa	<ul><li>Naive Ba</li><li>Logistic</li><li>rison between</li></ul> Periods: 9	Regressio en models	n – Multipl - Lift cha	e CO3
ssociation Rules odel – Regression near Regression sessment of a s UNIT-IV roduction to PM	Clustering Models –Decision Trees- Ruleset Mon Models –Regression Trees – Classification of Scorecards – Support Vector Machines – Tiningle model.  Predictive Modeling Markup Language  ML – PMML Converter - PMML Structure – Data I	& Regressine Series	on Tree Models	eighbors s (CART) - Compai	<ul><li>Naive Ba</li><li>Logistic</li><li>rison between</li></ul> Periods: 9	Regressio en models	n – Multipl - Lift cha	e CO3
ssociation Rules odel – Regression near Regression ssessment of a s UNIT-IV roduction to PM odel Support – N UNIT-V eka – RapidMin	Clustering Models –Decision Trees- Ruleset Mon Models –Regression Trees – Classification of Scorecards – Support Vector Machines – Tiningle model.  Predictive Modeling Markup Language  ML – PMML Converter - PMML Structure – Data Model Verification.	& Regressine Series  Manipulatio	on Tree Models on in PMI	eighbors s (CART) - Compai	<ul> <li>Naive Ba</li> <li>Logistic</li> <li>Periods: 9</li> <li>ML Modeling</li> <li>Periods: 9</li> </ul>	Regressio en models Technique	n — Multipl s - Lift char es - Multiple	CO4
ssociation Rules odel – Regression near Regression ssessment of a s UNIT-IV roduction to PM odel Support – M UNIT-V eka – RapidMin nguageReal tin	Clustering Models –Decision Trees- Ruleset Mon Models –Regression Trees – Classification of Scorecards – Support Vector Machines – Tiningle model.  Predictive Modeling Markup Language ML – PMML Converter - PMML Structure – Data Model Verification.  Technologies and Case Studies er – IBM SPSS Statistics- IBM SPSS Modeler me case study with modeling and analysis.	& Regressine Series  Manipulation  - SAS Ent	on Tree Models on in PMI	eighbors s (CART) - Compai	<ul> <li>Naive Ba</li> <li>Logistic</li> <li>Periods: 9</li> <li>ML Modeling</li> <li>Periods: 9</li> <li>Apache Mah</li> </ul>	Regression models  Technique	n — Multipl s - Lift char es - Multiple	CO4
ssociation Rules odel – Regression pear Regression sessment of a s UNIT-IV production to PM odel Support – N UNIT-V eka – RapidMin nguageReal tir Lecture Pext Books Statistical and lition,2011 Predictive Mo	Clustering Models –Decision Trees- Ruleset Mon Models –Regression Trees – Classification of Scorecards – Support Vector Machines – Tiningle model.  Predictive Modeling Markup Language ML – PMML Converter - PMML Structure – Data Model Verification.  Technologies and Case Studies er – IBM SPSS Statistics- IBM SPSS Modeler me case study with modeling and analysis.	& Regressine Series  Manipulation  - SAS Enter  Practical for Better  Solutions f	on Tree Models on in PMI terprise actical I	eighbors s (CART) - Compai  IML – PMM  Miner – A  Periods: tive Mod	- Naive Ba - Logistic rison between Periods: 9 ML Modeling Periods: 9 Apache Mah - leling and A	Regression models  Technique  Tota  nalysis or rd edition	n — Multiple - Lift char es - Multiple Programming al Periods f Big Data,	CO4 CO5
ssociation Rules odel – Regression pear Regression sessment of a s UNIT-IV production to PM odel Support – N UNIT-V eka – RapidMin nguageReal tir Lecture Pext Books Statistical and lition,2011 Predictive Mo	Clustering Models –Decision Trees- Ruleset Mon Models –Regression Trees – Classification on Models –Regression Trees – Classification on Scorecards – Support Vector Machines – Tiningle model.  Predictive Modeling Markup Language ML – PMML Converter - PMML Structure – Data Model Verification.  Technologies and Case Studies er – IBM SPSS Statistics- IBM SPSS Modeler me case study with modeling and analysis.  Periods: 45 Tutorial Periods: 15  d Machine-Learning Data Mining Techniques and Machine-Learning Data Mining Techniques and Sedeling with SAS Enterprise Miner Practical Sedeling with SAS Enterpris	& Regressine Series  Manipulation  - SAS Enter  Practical for Better  Solutions f	on Tree Models on in PMI terprise actical I	eighbors s (CART) - Compai  IML – PMM  Miner – A  Periods: tive Mod	- Naive Ba - Logistic rison between Periods: 9 ML Modeling Periods: 9 Apache Mah - leling and A	Regression models  Technique  Tota  nalysis or rd edition	n — Multiple - Lift char es - Multiple Programming al Periods f Big Data,	CO4 CO5

- 1.https://nptel.ac.in/courses/108108111/
- 2.https://www.coursera.org/learn/predictive-modeling-analytics 3.https://bookdown.org/egarpor/PM-UC3M/
- 4. https://cics.nd.edu/research/applications/materia
- 5. https://www.netsuite.com/portal/resource/articles/financial-management/predictive-modeling.shtml

### COs/POs/PSOs Mapping

COs	- <u>9</u>	Progra	m Out	Program Specific Outcomes (PSOs)					
200	PO1	PO2	PO3	PO4	PO5	P06	PSO1	PSO2	PSO3
1	2	3	2		-		1	2	1
2	3	3	3	≥ (q. 1 = 1) 	1	-	2	2	1
3	2	3	2	1	2		2	2	1
4	3	3	3	1	3		2	2	1
5	3	3	3	1	3	-	2	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Assessment		Continu	ous Asse	CAM)	End Semester	Total	
2 2 2 2 2	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	1	0	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

	4	ial Intelligence and Da	ata Science		nme: M.					1.000/1
Semester		erent care the agent of			Categor		End S	Semester	Exam Typ	
Course Code	P23AI	DE207	* 4	Pe	eriods / V	Veek	Credit	24 7 15 4	Maximum	Marks
-				L	T	Р	C	CAM	ESE	TM
Course Name	Next (	Seneration Databases		3	- [AS #6	- 7.191 <u>2</u> 11 (*)	3	40	60	100
			(	(AI &DS)				4	I and the second	1-2-1-5
Prerequisite	NIL		. 7	` <u>-</u>						
	On cor	npletion of the course	, the studen	ts will be	able to	***************************************	a PARKE		BT M	apping
				Sit in					(Highes	t Level
Course	CO1	Understanding the mark	ket and techr	nology for	ces lead	ing to to	day's next g	generatio	n P	(3
Outcomes										
	CO2 Mastering in Hadoop architecture with querying in various Hadoop components									
	CO3 Demonstrating the working of XML and JSON Document Databases									(3
	CO4 Understanding the database applications oriented to Graph and Column databases									(3
	CO5	Applying the Distributed HBase and Cassandra	olying the Distributed Database patterns and consistency models in MongoDB,							
UNIT-I	Datab	ase Revolution					Periods: 9			
Database Wars -	Client-se	<ul> <li>Second Database Revoluter Computing – Object uting – Document Databa</li> </ul>	Oriented Prog	gramming	- Transa and OOD	action Mod DBMS - T	dels – First F hird Databa	Relational se Revolu	Databases – ition: Google	СО
UNIT-II	Hado	op: Open-Source Goo	gle Stack				Periods: 9			
∃adoop's Origin – Data. Hadoop's Ec	Power o	f Hadoop – Hadoop's Arch – MapReduce – Hbase –	nitecture – Wor Pig - Hive: Qu	rking with lerying Big	Hadoop: L Data with	oading D n Hive – L	ata – Handli Jsing Hive to	ng Files – query Ha	Getting doop files.	СО
UNIT-III	Docu	ment Databases								L
	1						Periods: 9			
		s and Standards – XML su t Databases – Early JSON				ON Docur	ment Databas	ses – JSC	N and AJAX	1
	ocumen	s and Standards – XML su t Databases – Early JSON n and Column Databas	N Databases –			ON Docur chBase –	ment Databas	ses – JSC	N and AJAX	1
- Data Models in D UNIT-IV Graph Database: F	Graph RDBMS I	t Databases – Early JSON a and Column Databas Pattern for Graphs – RDF	Databases – ses and SPARQL	MemBase  - Property	and Cou	ON Docur chBase –	ment Databas MongoDB Periods: 9	Graph Da	atabase	CO
- Data Models in D UNIT-IV Graph Database: Forternals — Graph (	Graph Graph RDBMS I Compute	t Databases – Early JSON and Column Databas Pattern for Graphs – RDF Engines. Column Databa	N Databases – Ses and SPARQL ses: Data War	MemBase  – Property rehouse So	Graphs a	ON Docur chBase – land Neo4j Columnar	ment Databas MongoDB Periods: 9 – Gremlin – Alternative (	Graph Da	atabase	CO
- Data Models in D UNIT-IV Graph Database: Forternals — Graph Compression, Columnia (Columnia	Grapt Compute Immar W	t Databases – Early JSON a and Column Databas Pattern for Graphs – RDF Engines. Column Databa rite Penalty) – Sybase IQ,	N Databases –  Ges  and SPARQL ses: Data War C-Store and \	MemBase  – Property rehouse So /ertica – C	Graphs a chema – (	ON Docur ichBase – Iand Neo4j Columnar itabase A	ment Databas MongoDB Periods: 9 — Gremlin — Alternative (rechitectures.	Graph Da	atabase	СО
- Data Models in D UNIT-IV Graph Database: F nternals – Graph (	Grapt Compute Immar W	t Databases – Early JSON and Column Databas Pattern for Graphs – RDF Engines. Column Databa	N Databases –  Ges  and SPARQL ses: Data War C-Store and \	MemBase  – Property rehouse So /ertica – C	Graphs a chema – (	ON Docur ichBase – Iand Neo4j Columnar itabase A	ment Databas MongoDB Periods: 9 – Gremlin – Alternative (	Graph Da	atabase	CO
- Data Models in D UNIT-IV Graph Database: F nternals – Graph Compression, Colu UNIT-V Distributed Databa	Graph RDBMS I Compute Jumnar W Distri	t Databases – Early JSON a and Column Databas Pattern for Graphs – RDF Engines. Column Databa rite Penalty) – Sybase IQ,	I Databases – ses and SPARQL ses: Data War C-Store and \( \) rns and Con I Databases – els: Types of C	Property ehouse So /ertica – Co sistency  Non-relation	Graphs a chema – (olumn Da Models ponal Distriy – Consi	ON Docur ichBase – I and Neo4j Columnar atabase A	ment Database MongoDB Periods: 9 — Gremlin — Alternative ( rchitectures. Periods: 9  tabases — Mo	Graph Da Columnar	atabase	CO
- Data Models in D UNIT-IV Graph Database: Finternals — Graph Compression, Columnitary UNIT-V Distributed Database	Graph  Graph  RDBMS I  Compute  Jumnar W  Distri  ase Patte  se – Cas	t Databases – Early JSON and Column Database Pattern for Graphs – RDF Engines. Column Databasite Penalty) – Sybase IQ, buted Database Patterns: Distributed Relational sandra. Consistency Mode	I Databases – ses and SPARQL ses: Data War C-Store and V rns and Con I Databases – els: Types of C Cassandra Co	— Property rehouse So /ertica — Cosistency  Non-relation consistency consistency	Graphs a chema – (olumn Da Models  onal Distriy – Consi	ON Docur ichBase – I and Neo4j Columnar atabase A	ment Databas MongoDB Periods: 9 — Gremlin — Alternative ( rchitectures. Periods: 9  tabases — MongoDB —	Graph Da Columnar ongoDB S Hbase Co	atabase	co
- Data Models in D UNIT-IV Graph Database: Finternals — Graph (Compression, Columnt-V) Distributed Databate Replication - HBar	Graph  Graph  RDBMS I  Compute  Jumnar W  Distri  ase Patte  se – Cas	t Databases – Early JSON and Column Database Pattern for Graphs – RDF Engines. Column Databasite Penalty) – Sybase IQ, buted Database Patterns: Distributed Relational sandra. Consistency Mode	I Databases –  Ges  and SPARQL ses: Data War C-Store and V rns and Con  I Databases – els: Types of C Cassandra Co	— Property rehouse So /ertica — Cosistency  Non-relation consistency consistency	Graphs a chema – (olumn Da Models  onal Distriy – Consi	ON Docur ichBase – I and Neo4j Columnar atabase A I ibuted Da istency in	ment Databas MongoDB Periods: 9 — Gremlin — Alternative ( rchitectures. Periods: 9  tabases — MongoDB —	Graph Da Columnar ongoDB S Hbase Co	atabase Sharding and onsistency –	co
- Data Models in D UNIT-IV Graph Database: Finternals – Graph Compression, Columbrate Compression, Columbrate Compression – HBarbar Replication – HBarbar Books Lecture Perfect Books I. Enhancing Ava Caur 2. NoSQL A community (1) 10 10 10 10 10 10 10 10 10 10 10 10 10	Graph Graph Compute Jumnar W Distri  ase Patte se – Case eriods:  ailability plete gu	t Databases – Early JSON and Column Databas Pattern for Graphs – RDF Engines. Column Databar rite Penalty) – Sybase IQ, buted Database Patter rns: Distributed Relational sandra. Consistency Mode for NoSQL Database S	A Databases –  Ses  and SPARQL ses: Data War C-Store and V rns and Con  I Databases – els: Types of C Cassandra Ce eriods: 15	MemBase  — Property rehouse So /ertica — Co sistency  Non-relation consistency  Property  Proper	Graphs a chema – (olumn Da Models  Donal Distriy – Consi	ON Docur ichBase – I and Neo4j Columnar atabase A ibuted Da istency in	ment Databas MongoDB  Periods: 9 — Gremlin — Alternative ( rchitectures. Periods: 9  tabases — Mi MongoDB —	Graph Da Columnar ongoDB S Hbase Co	sharding and onsistency –	CO CO
- Data Models in D UNIT-IV Graph Database: Finternals – Graph Compression, Columbrated Database Replication - HBase Lecture Perfect Books I. Enhancing Ava Caur I. NoSQL A com	Graph Graph Compute Jumnar W Distri  ase Patte se – Case eriods:  ailability plete gu	t Databases – Early JSON and Column Databas Pattern for Graphs – RDF Engines. Column Databas rite Penalty) – Sybase IQ, buted Database Patter rns: Distributed Relational sandra. Consistency Mode for NoSQL Database S  tide,2021 edition	A Databases –  Ses  and SPARQL ses: Data War C-Store and V rns and Con  I Databases – els: Types of C Cassandra Ce eriods: 15	MemBase  — Property rehouse So /ertica — Co sistency  Non-relation consistency  Property  Proper	Graphs a chema – (olumn Da Models  Donal Distriy – Consi	ON Docur ichBase – I and Neo4j Columnar atabase A ibuted Da istency in	ment Databas MongoDB  Periods: 9 — Gremlin — Alternative ( rchitectures. Periods: 9  tabases — Mi MongoDB —	Graph Da Columnar ongoDB S Hbase Co	sharding and onsistency –	CO CO
Data Models in DUNIT-IV  Graph Database: Forternals — Graph Compression, Columbrate Database Replication - HBarbar Lecture Personal Compression of Compressi	Graph Graph Compute Important William Graph Compute Important William Graph Gr	t Databases – Early JSON and Column Databas Pattern for Graphs – RDF Engines. Column Databarite Penalty) – Sybase IQ, buted Database Patter rns: Distributed Relational sandra. Consistency Mode for NoSQL Database S ide,2021 edition The Definitive Guide", 4 eneration Databases: N fanish Kumar, "Masterii	A Databases –  Ses  and SPARQL ses: Data War C-Store and V rns and Cons  I Databases – els: Types of C Cassandra Ce eriods: 15  Systems using  I battabases – I battabases	MemBase  — Property ehouse So /ertica — Cosistency  Non-relation Consistency  Property  Property  Grailover  15	Graphs a chema – (olumn Da Models  Donal Districy – Consideractical I	ON Documor Inches Inche	ment Databas MongoDB  Periods: 9  - Gremlin – Alternative ( rchitectures.  Periods: 9  tabases – Mi MongoDB –  - anka Gotte  s Publisher	Graph Da Columnar ongoDB S Hbase Co Tota r, Kiranbi	sharding and onsistency – al Periods: ir Kaur, Tan	CO CO
Data Models in D UNIT-IV Graph Database: Finternals – Graph Compression, Colu UNIT-V Distributed Databa Replication - HBa Lecture Perest Books Lender Books Lender Book Lecture Perest Books Lender Book Gaur Lecture Perest	Graph Graph Compute Jumnar W Distri  ase Patte se - Case eriods: ailability plete gu ladoop: (S "Next G gh and M ublishing nellappa	t Databases – Early JSON and Column Databas Pattern for Graphs – RDF Engines. Column Databar rite Penalty) – Sybase IQ, buted Database Patter rns: Distributed Relational sandra. Consistency Mode for NoSQL Database S lide, 2021 edition The Definitive Guide", 4 eneration Databases: N fanish Kumar, "Masterin, 2019. n, Dharanitharan Ganes	A Databases –  Ses  and SPARQL ses: Data War C-Store and V rns and Con  I Databases – els: Types of C Cassandra Co eriods: 15  Systems using  I batabases – les: Types of C Cassandra Co eriods: 15  Systems using  I batabases – les: Types of C Cassandra Co eriods: 15  Systems using  I batabases – les: Types of C Cassandra Co eriods: 15  Systems using  I batabases – les: Types of C Cassandra Co eriods: 15  Systems using  I batabases – les: Types of C Cassandra Co eriods: 15  Systems using  I batabases – les: Types of C Cassandra Co eriods: 15  Systems using  I batabases – les: Types of C Cassandra Co eriods: 15  Systems using  I batabases – les: Types of C Cassandra Co eriods: 15  Systems using  I batabases – les: Types of C Cassandra Co eriods: 15  Systems using  I batabases – les: Types of C Cassandra Co eriods: 15  Systems using  I batabases – les: Types of C Cassandra Co eriods: 15  Systems using  I batabases – les: Types of C Cassandra Co eriods: 15  Systems using  I batabases – les: Types of C Cassandra Co eriods: 15  Systems using  I batabases – les: Types of C Cassandra Co eriods: 15  Systems using  I batabases – les: Types of C Cassandra Co eriods: 15  Systems using  I batabases – les: Types of C Cassandra Co eriods: 15	MemBase  — Property rehouse So /ertica — Co sistency  Non-relating Consistency  Property  Property  Rehouse So /ertica — Co sistency  Non-relating Consistency  Property  Grailove  15  SQL, and Big data  DB Recip	Graphs a chema – (olumn Da Models  Donal District y – Consider Technical III  Big Data process es: With	ON Document of the control of the co	ment Databas MongoDB  Periods: 9 — Gremlin — Alternative ( rchitectures. Periods: 9  tabases — MongoDB — — anka Gotte  s Publisher ale to unlock deling and	Graph Da Columnar ongoDB S Hbase Co Tota r, Kiranbi	sharding and onsistency – al Periods:	CO CO CO sights"

- 1. https://www.researchgate.net/publication/221214756\_The\_Next\_Database\_Revolution
- 2. https://cloudxlab.com/blog/big-data-solution-apache-hadoop-and-spark/
- 3. https://www.mongodb.com/document-databases
- 4. https://www.geeksforgeeks.org/document-databases-in-nosql/
- 5. https://towardsdatascience.com/cap-theorem-and-distributed-database-management-systems-5c2be977950e

### COs/POs/PSOs Mapping

Edige 9	Progra	m Out	Program Specific Outcomes (PSOs)						
PO1	PO2	PO3	PO4	PO5	P06	PSO1	PSO2	PSO3	
2	3	2	-	-16	i.	_1_	2	11	
3	3	3	10 ±.13	1	-	2	2	1	
2	3	2	1	2	-	2	2	1	
3	3	3	1	3	-	2	2	1	
3	3	3	1	3	-	2	2	1	
	PO1 2 3 2	PO1 PO2 2 3 3 3 2 3	PO1 PO2 PO3 2 3 2 3 3 3 2 3 2 3 3 3	PO1         PO2         PO3         PO4           2         3         2         -           3         3         3         -           2         3         2         1           3         3         3         1	PO1         PO2         PO3         PO4         PO5           2         3         2         -         -           3         3         3         -         1           2         3         2         1         2           3         3         1         3	2     3     2     -     -     -       3     3     3     -     1     -       2     3     2     1     2     -       3     3     3     1     3     -	Program Outcomes (POS)         Outcomes           PO1         PO2         PO3         PO4         PO5         PO6         PSO1           2         3         2         -         -         -         1           3         3         3         -         1         -         2           2         3         2         1         2         -         2           3         3         1         3         -         2	Program Outcomes (POS)         Outcomes (P           PO1         PO2         PO3         PO4         PO5         PO6         PSO1         PSO2           2         3         2         -         -         -         1         2           3         3         3         -         1         -         2         2           2         3         2         1         2         -         2         2           3         3         3         1         3         -         2         2	

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment	1 1 1 1 1	Continu	ious Ass	essment Marks	(CAM)	End Semester	Total
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	i an i	10	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

	Artificial Intelligence and Data Science	Program			= 1 = 1	- 1		Service Servic
Semester		Course (			End	Semester	Exam Typ	
Course Code	P23ADE208	Per	iods / W	<b>√</b> eek	Credit	a Alah Ba	Maximum	Marks
	i ur aexit ic si	L 12 18	r T−	Р	C	CAM	ESE	TM
Course Name	Advanced Algorithms	3		Prince T	3	40	60	100
ah byrret er		AI &DS)	7475.					700
Prerequisite	NIL	9 16 3						
	On completion of the course, the student	s will be	able to		1 (12 m)			lapping st Level
Course	CO1 Analyze algorithms to determine algorithms	orithm cor	rectness	S		W. I W. J V.	. +\.v.=2)	K3
Outcomes	CO2 Analyze algorithms to determine time	e efficienc	у			/		K3
	CO3 Master a variety of advanced data st	ructures a	nd their	impleme	entations			K3
	CO4 Master a variety of different algorithm	n design te	echniqu	es				K3
	CO5 Apply and implement the learnt algor				solve pro	blems		K3
UNIT-I	Basics of Algorithm Analysis	4001	,		eriods: 9			
	actability – Asymptotic Order of Growth – Impleme running times – A more Complex Data Structure:			AICHING AIG	joritnm Us	ing Lists an	iu Arrays – i	CO1
UNIT-II	Graphs and Greedy Algorithms	***************************************		P	eriods: 9	ogietekk re	all Saide II	
UNIT-III First Recurren oints – Integer M ynamic Program ums and Knapsa	and Data Compression  Divide and Conquer  ce: The Merge sort Algorithm – Further Recurrence ultiplication Dynamic Programming: Weighted Irming: Memoization or Iteration over Subproblems tecks: Adding a variable – Shortest Paths in a Grap	nterval Sch – <b>Segmen</b>	eduling: . ted Leas	ting Inversi A Recursi st Square	ve Procedi s: Multi-wa	ure – Principay Choices	ples of – Subset	CO3
ycles in a Graph UNIT-IV	Network Flow				eriods: 9			
he Maximum-Flo	w Problem and the Ford-Fulkerson Algorithm – M. Paths – A First Application: The Bipartite Matchin			Minimum	Cuts in a N			CO4
ood Augmenting								
UNIT-V	NP and Computational Intractability	***************************************		P	eriods: 9			
UNIT-V olynomial-Time l	NP and Computational Intractability  Reductions – Efficient Certification and the Definitions – Graph Coloring – Co-NP and the Asymmetry		– NP-Co			Sequencing	Problems	
UNIT-V olynomial-Time l	Reductions – Efficient Certification and the Definitions – Graph Coloring – Co-NP and the Asymmetr	y of NP.			oblems –		Problems	CQ5
UNIT-V olynomial-Time l artitioning Proble	Reductions – Efficient Certification and the Definitions – Graph Coloring – Co-NP and the Asymmetr	y of NP.		mplete Pr	oblems –			CQ5
UNIT-V olynomial-Time I artitioning Proble ecture Periods ext Books . Advanced Da . Algorithms,R . George Heine and edition,2016	Reductions – Efficient Certification and the Definitions – Graph Coloring – Co-NP and the Asymmetres: 45  Tutorial Periods: 15  ata Structures And Algorithms ,1 <sup>st</sup> edition 20 obert Sedgewick and Kavin Wayne,4 <sup>th</sup> edition and (Author), Gary Pollice (Author), Stanley	y of NP. Pra	actical I	emplete Pr	oblems —	Tota	al Periods	CQ5
UNIT-V olynomial-Time lartitioning Proble ecture Periods ext Books . Advanced Da . Algorithms,R . George Heine dedition,2016	Reductions – Efficient Certification and the Definitions – Graph Coloring – Co-NP and the Asymmetres: 45  Tutorial Periods: 15  ata Structures And Algorithms ,1 <sup>st</sup> edition 20 obert Sedgewick and Kavin Wayne,4 <sup>th</sup> edition and (Author), Gary Pollice (Author), Stanley	y of NP. Pra	actical I	Periods:	oblems —	Tota	al Periods	CQ5

- 1. https://www.scaler.com/topics/analysis-of-algorithm/
- 2. https://www.codingninjas.com/studio/library/greedy-algorithm-in-graph-theory
- 3. https://www.tutorialspoint.com/data\_structures\_algorithms/divide\_and\_conquer.htm
- 4. https://www.cs.cmu.edu/~avrim/451f11/lectures/lect1025.pdf
- 5. https://cseweb.ucsd.edu//classes/sp05/cse101/Day19NP.pdf

#### COs/POs/PSOs Mapping

COs	12	Progra	m Out	Program Specific Outcomes (PSOs)					
4	PO1	PO2	PO3	PO4	PO5	P06	PSO1	PSO2	PSO3
1	2	3	2	- 1204	Y-1	, i <del>-</del> 1. 1	1	2	1
2	3	3	3		1		2	2	1
3	2	3	2	1	2	-121	2	2	1
4	3	3	3	1	3	-	2	2	1
5	3	3	3	. 1	3	na Tuna	2	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment	1	Continu	ous Asse	(CAM)	End Semester	Total	
entre en entre en et e	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	10	0	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

	Artificial Intelligence and Data Science	Program			- <u> </u>			
Semester		1	Category			Semeste		<u> </u>
Course Code	P23ADE209		ds/Weel		Credit		ximum Ma	arks
	. 20, 02200	L	Т	Р	С	CAM	ESE	TM
Course Name	Business Intelligence and Reporting	3 (4)	34.23 <b>-</b> 1.13		3	40	60	100
len kar ya	restate escale atem (1	AI&DS)	s I gove	- 440				
Prerequisite	Basic Artificial Intelligence and Data Scien	ce						
Trible Williams	On completion of the course, the studen		able to		1.587.4		BT Map	ping
							(Highes	
Course Outcomes	CO1 Understand the Business intelligence	e framewo	ork and r	espons	ibilities	7 4		₹2
Outcomes	CO2 Design the ETL process for handling	the data	from a g	iven sc	urce		ŀ	<b>&lt;</b> 3
	CO3 Design a star / snowflake schema fo	r a given	problem.				B B B B	<b>&lt;</b> 3
	CO4 Ability to illustrate the data mining co	oncepts w	ith suitab	le exar	nples.	1 1	·	<b>&lt;</b> 3
	CO5 Ability to apply classification and pre	diction co	ncepts to	variou	us application	ons		<b>&lt;</b> 2
UNIT – I	Introduction to Business Intelligence				Periods:9			
BI Definitions &C	Concepts, BI Framework, Data Warehousing cor	ncepts and	l its role	n Bl, B	I Infrastruc	ture Comp	onents -	ВІ
Process, BI Tech	nology, BI Roles & Responsibilities, Business, Ap	plications	of BI, BI b	est prac	ctices	- Y E - 12 M		CO1
UNIT – II	Basics of Data Integration				Periods:9			
Concents of data	integration, Needs and advantages of using data	integration	n introduc	tion to a	common data	integratio	n	CO2
	data - types and sources, Introduction to data qu							002
	no data Integration (formerly Kettle).			VERT P	-2 10 18.11			
UNIT – III	Introduction to Multi-Dimensional Data N				Periods:9			
	ntroduction to data and dimension modelling, mu	ultidimensid	onal data		ER Modellin	g vs. multi		
	use of discountings forth and a study that bises			D-1			the Language of the Language o	
	epts of dimensions, facts, cubes, attribute, hiera	archies, sta	ar and sr	owflake		ntroduction	to busine	SS
metrics and KPIs	, Creating cubes using Microsoft Excel.	archies, sta	ar and sr	owflake	schema, Ir	ntroduction	to busine	SS
metrics and KPIs UNIT – IV	, Creating cubes using Microsoft Excel.  Working With BI Tools				e schema, Ir			
metrics and KPIs UNIT – IV Overview of mailimplementation, a	, Creating cubes using Microsoft Excel.  Working With BI Tools  nagerial, strategic and technical issues associated utilization. Critical issues in planning, physical	ated with E	Business	Intellige	Periods:9	ita Wareho	ouse desig	ın, CO4
metrics and KPIs  UNIT – IV  Overview of manimplementation, a  Boards and Score	, Creating cubes using Microsoft Excel.  Working With BI Tools  nagerial, strategic and technical issues associated utilization. Critical issues in planning, physical ecards Creation.	ated with E	Business	Intellige	Periods:9 nce and Daent and ongo	ita Wareho	ouse desig	ın, CO4
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metrics and KPIs  UNIT – IV  Overview of man implementation, a Boards and Score  UNIT – V  Emerging Techn Advanced Visua	, Creating cubes using Microsoft Excel.  Working With BI Tools nagerial, strategic and technical issues associa and utilization. Critical issues in planning, physical ecards Creation.  Future of Business Intelligence hologies, Machine Learning, Predicting the Future lization – Rich Report, Future beyond Technology	ated with E al design p with the he	Business rocess, de	Intellige eployme	Periods:9 nce and Da ent and ongo Periods:9 sis, BI Search	ita Wareho ing mainte	ouse designance. Dan	ın, CO4
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Cos		Progra	m Out	Program Specific Outcomes (PSOs)					
Pho	PO1	PO2	PO3	PO4	PO5	P06	PSO1	PSO2	PSO3
1	2	3	2	. <u>.</u>	<u>-</u>		1	2	1
2	3	3	3	W.V. T. 11.	1	- 100	2	2	1
3	2	3	2	1	2		2	2	1.
4	3	3	3	1	3	71-5	2	2	111
5	3	3	3	1	3		2	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment		Continu	ous Asse	CAM)	End Semester	Total	
9	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	1	0	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	Artifici	ial Intelli	gence and	Data Science	Program	me: <b>M.</b>	Tech.			. 1 2.20	
Semester	11	12 12 22			Course	Categor	y : PE	End	Semeste	er Exam Ty	oe: <b>TE</b>
Course Code	P23AD	E210	denying pro-fi		Per	iods / W	/eek	Credit		Maximum	Marks
		14900			L	_1T	Р	С	CAM	ESE	TM
Course Name	Stream	ning Ana	lytics		3		-	3	40	60	100
			Pagarita	(	AI &DS)						-,
Prerequisite	-					<u>Yajar</u>					
		T T	r Nir.	se, the studer		able to	)			(Highe	lapping est Level)
Course Outcomes	CO1			or stream comp			n state of	2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4			K2
Outcomes	CO2	Compre	ehend the a	rchitecture of st	tream ana	lytics.					K3
	CO3	Build da	ata flow mai	nagement pipel	ines for st	reams.	11/				K2
	CO4	Proces	s the strear	ning data.							K3
	CO5	Deliver	the results	of streaming ar	nalytics.						K3
UNIT-I	Introd	uction to	stream co	mputing				Periods: 9			, , , , , , , , , , , , , , , , , , ,
Streaming Data – Engines – Issues				Streaming Data	and Static	Data. O	verview	of Large-Sc	ale Strear	m Processin	9 CO1
UNIT-II	Stream	ning ana	lytics arch	itecture				Periods: 9	11.64	_195 ·	
Phases in Stream Folerance - Servic						– Low L	atency -	– Horizontal :	Scalability	/-Fault	CO2
UNIT-III	Data f	low man	agement			1 - 01	T	Periods: 9			
Distributed Data F Passing.	lows – At	Least On	e Delivery –	Apache Kafka –	Apache Flu	ıme – Ze	ro MQ -	Messages, E	Events, Ta	asks& File	CO3
UNIT-IV	- 1	and the second second second second		eaming data				Periods: 9			
Distributed Strean Filters - Apache S									ion using	Bloom	CO4
UNIT-V	Delive	ring stre	eaming met	trics	***************************************			Periods: 9			
Visualizing Data				Data	١.						
Lecture P	eriods: 3	30	Tutorial	Periods: 15	Pra	actical F	Periods	s: - <u> </u>	Tot	tal Periods	: 45
Text Books											
MIT Pre	ss, 2018			ff Holmes, Berr ning Architectu					rning for	Data Strea	ims, The
		ge Scale	and Big Dat	a: Processing	and Mana	gemenť	', CRC	Press, 2014	1		
Reference Boo				<i>"</i> 5 ! !!!	us 4: .					, ,	
2014.			•	ffrey D. Ullman						•	
and Stre	eaming D	oata", Mc	Graw-Hil, 1:	l Zikopoulos, "U st edition, 2011							
<ol><li>Bill Fran</li></ol>	ıks, "Tam			chniques to An dal Wave Findi							
vviiev 2											······································
Wiley, 2 Veb Reference	S										
Neb Reference 1. https://w	ww.tutoi			d-outs-of-data-			410ta-11114				
Neb Reference 1. https://w 2. https://w 3. https://fl	ww.tutor ww.java ume.apa	tpoint.co che.org/	m/kafka-key	d-outs-of-data- y-concepts-of-s stream-in-data-	tream-pro	cessing		eka a ayuun atuuta ana ana			

COs		Progra	m Out	Program Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	3	2	Florid	h =	1-1	1	2	1
2	3	3	3		11		2	2	1
3	2	3	2	1 1	2	1400	2	2	1
4	3	3	3	1	3	-	2	2	1
5	3	3	3	1	3	112 71	2	2	1.

Correlation Level: 1 - Low, 2 - Medium, 3 – High

ASSESSMENT		Continu	uous Assessment Marks (CAM)  End Semester Examination (ESE) Marks				Total Marks
<u>a</u> -1-, <u>x</u> 2 , <u>2</u> 1	CAT 1	CAT 2	Model Exam	Assignment	Attendance		
Marks	1	0	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	Artifici	ial Intelli	gence and Data Science	Progran	nme: M.	Tech.	£ nens		Mr 10	
Semester	11	3 3,074	I was a second second as the second	Course	Categor	y : PE	End 9	Semeste	r Exam Typ	e: TE
Course Code	P23AD	E211	Souther Commence	Per	iods / V	Veek	Credit	fa.	Maximum	Marks
	(s., d. b.	raffe)r		_ ".L.	Т	P	C	CAM	ESE	TM
Course Name	Machin	ne Learn	ing with Large Datasets	3	Carifford 1	-	3	40	60	100
				AI &DS)	400000	<del> </del>				
Prerequisite			light digit blake in the	Jr - Jan	Add Arch			535 o j. voja 1		
	On con		of the course, the studen							apping st Level)
Course	CO1	Learn v	various types of algorithms	to handle	the larg	e data.				₹2
Outcomes	CO2	Apply p	parallel and distributed ML t	echnique	s to get	the insig	ghts of the la	arge data	i.	₹3
	CO3	Identify	suitable ML framework to	develop th	ne real-v	world ap	plication.			₹2
	CO4	Demo	nstrate graph-based learning	g algorith	ms.					₹3
	CO5	Develo	p scalable learning technique	ues both i	n standa	alone ar	nd distribute	d settina	s. I	₹3
UNIT-I	Stream		nining algorithms	0 - 0 2	1		Periods: 9			
Stream Data mod Decaying windows	el, sampli s, Naïve E	ing data i Baye's, Fr	n a stream, filtering algorithms equent Item sets: Handling lar	s, counting ger datase	distinct ts in mer	elements	s in a stream unting freque	, estimatir nt itemset	ng moments in a stream.	CO1
UNIT-II	Tools	for large	e data sets			T	Periods: 9			4
ntroduction to Ha	doop, Hadoop	doop strea	aming Debugging Hadoop, Co pioins, page rank, spark, phras	mbiners, S se finding.	calable o	classifica	tion, Abstract	ts for map	-reduce	CO2
UNIT-III	Gradie	ent desc	ent and Hash kernels		ľ	- I	Periods: 9			
			ression with SGD, Efficient re	gularized S	GD, Has	sh kernel	s for logistic	regression	n, matrix	
UNIT-IV			atrix factorization with SGD.  ine learning algorithms &	Random	ized		Periods: 9			CO:
OIIII-IV	algori		inc learning algorithms a	Rundom	izcu		i cilous. J			
			rning from nearest neighbors,		sign of E	Decision	trees. Rando	mized alg	orithms:	CO
Bloom filters, Loca			ng, online locality sensitive ha <b>VIL tools</b>	shing.			Periods: 9			<u> </u>
			aract OCR, Detectron, Natural	Language	Drocess			D. Music	and Audio	COS
Computer visio	i-Simple	CV, 16336	analysis-LibROSA, Other to				nord core INC	r, iviusic	and Addio	CO
Lecture P	eriods: 3	30	Tutorial Periods: 15	Pr	actical l	Periods	: -	Tota	al Periods:	45
press, 2 2. Bekkern approac 3. John T. Reference Bool	020. nan, Ron hes. Car Wolohar s	n, Mikhail mbridge n, "Maste	ajaraman, and Jeffrey David Bilenko, and John Langfor University Press, 2011. ring Large Datasets with P	d, eds. So	caling up	o machir	ne learning: ons, 2020.			
<ol> <li>Wilt, Nic</li> <li>Frank Page</li> </ol>	holas. Ti ane , "Ha	he cuda ands On	Bengio, and Aaron Courville handbook: A comprehensiv Data Science and Python N	re guide to Machine L	gpu pr earning	ogramm ", Packt	ning. Pearso	2017.		

- 1. https://www.geeksforgeeks.org/splitting-data-for-machine-learning-models/.
- https://www.javatpoint.com/data-preprocessing-machine-learning.
   https://towardsdatascience.com/beginners-guide-to-machine-learning-with-big-data-d6dbb155673c.

COs		Progra	m Out	Program Specific Outcomes (PSOs)					
71	PO1	PO2	PO3	PO4	PO5	P06	PSO1	PSO2	PSO3
1	2	3	2				1	2	1
2	3	3	3	, - ·	1-1-	1 447	2	2	1.
3	2	3	2	1	2	ersk <del>-</del> tre	2	2	1-1-1-
4	3	3	3	1	3	-	2	2	1
5	3	3	3	1	3	100.20	2	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

		Continuo	CAM)	End			
ASSESSMENT	CAT 1	CAT 2	Model Exam	Assignment	Attendance	Semester Examination (ESE) Marks	Total Marks
Marks	1	0	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	Arunci	al Intelligence and Data Science	Progran	nme: M.	Tech.		100	1.5 ft.1				
Semester	11	Course Category : PE End Semester Exam Typ										
Course Code	P23AD	23ADE212 Periods / Week Credit Maximum M										
	P23ADE212         Periods / Week         Credit         Maximum M           L         T         P         C         CAM         ESE           R for Data Science         3         -         -         3         40         60											
Course Name	R for D	ata Science	3	74 U <u>1</u> 5	igeleft e	3	40	60	100			
	<b>L</b>	(A)	&DS)					1 - 7 - 20				
Prerequisite	[ <b>-</b>			A reels			1,411	nexted Har	devi :			
	On con	pletion of the course, the studen	ts will be	able to				1	apping st Leve			
Course Outcomes	CO1	Study and use basic fundamental of R programming language.	concepts	to solve	the real-	world prob	lem using		₹2			
	CO2	Design and implement the solution problems in R program.	tors, ma	trices and	statistical	ŀ	(3					
	CO3	Design and implement the program for various problem.				•	solution		₹3			
	CO4	Study about factors and tables an	d to solve	statistic	al proble	ems.		ŀ	<b>(</b> 2			
	CO5	Study Minimize and maximize functionallysis using R.	tions, sim	ulation a	ınd visua	alization an	d statistica	al P	₹2			
UNIT-I	Introd					Periods: 9			50			
				a Arithm	etic. Mod	lulo and inte	ger quotier	its, Variat	ole CO1			
ames and assign	ment, Op	R, Calculations, Complex numbers in Ferators, Integers, Factors, Logical opera		g, Anum				JUI				
UNIT-II Control structures Structures, Vector ubscripts, Extrac Matrices, Adding	Control function function s, Chara ting elem and Dele ical Oper		atroduction ames, Cla forking wit Length of	to Func sses Vec h logical a Vecto	tions, pre ctors: Ge subscrip r, Matrice	nerating se ots, Scalars,	quences, \ Vectors,	/ectors a Arrays, a	nd nd			
UNIT-II Control structures Structures, Vector ubscripts, Extrac Matrices, Adding writhmetic and Log UNIT-III Lists: Creating List example: Text Co	Control function func	erators, Integers, Factors, Logical opera of Structures and Vectors is, scoping rules, dates and times, In- cter Strings, Matrices, Lists, Data Fra- ients of a vector using subscripts, Wating Vector Elements, Obtaining the attions, Vector Indexing, Common Vector and Data Frames at List Operations, List Indexing Adding e Accessing List Components and Va	atroduction ames, Cla forking wit Length of or Operation	to Func sses Vec h logical a Vecto ns.	tions, prectors: Ge subscrip r, Matrice	eview of So enerating se ots, Scalars, es and Arra Periods: 9	quences, \ Vectors, ays as Vec	/ectors a Arrays, a ctors Vec	nd nd tor			
UNIT-II Control structures Structures, Vector ubscripts, Extrac Matrices, Adding writhmetic and Log UNIT-III Lists: Creating List example: Text Co	Control function func	erators, Integers, Factors, Logical opera of Structures and Vectors is, scoping rules, dates and times, In- cter Strings, Matrices, Lists, Data Fra- tents of a vector using subscripts, Wating Vector Elements, Obtaining the attions, Vector Indexing, Common Vector and Data Frames at List Operations, List Indexing Adding	atroduction ames, Cla forking wit Length of or Operation and Deletin lues Apply	to Func sses Vec h logical a Vecto ns. ng List El ing Func	tions, pre- ctors: Ge subscrip r, Matrice ements, (	eview of So enerating se ots, Scalars, es and Arra Periods: 9	quences, Vectors, ays as Vec	/ectors a Arrays, a ctors Vec	nd nd tor			
UNIT-II Control structures Structures, Vector ubscripts, Extrac Matrices, Adding writhmetic and Log UNIT-III Lists: Creating List example: Text Co Frames, Accessing UNIT-IV Cnowledge repres Mathematical Morg keleton - thinning	Control function func	erators, Integers, Factors, Logical operators and Vectors as, scoping rules, dates and times, Incter Strings, Matrices, Lists, Data Fracents of a vector using subscripts, Wating Vector Elements, Obtaining the ations, Vector Indexing, Common Vector and Data Frames al List Operations, List Indexing Adding the Accessing List Components and Valames, Other Matrix-Like Operations	atroduction ames, Cla /orking wit Length of or Operation and Deletin lues Apply distributed in Program in pattern in patt	to Functions to Functions to Functions.  In a Vector i	ements, (constraints)	eview of Somerating sectors, Scalars, es and Arranders 9 Getting the Solists, Data Interior technology - home Inheritance	Quences, Vectors, vectors, ays as Vectors as Vectors. Size of a Listrames, Crames, Crames, Crames, Crames, S Classe	Vectors a Arrays, a stors Vec st, Extend eating Da recognitio sformation s, Writing	ed cos			
UNIT-II Control structures Structures, Vector ubscripts, Extrac Matrices, Adding writhmetic and Log UNIT-III Lists: Creating List Example: Text Co Frames, Accessing UNIT-IV Chowledge repress Mathematical Morp keleton - thinning Classes, Implementanipulation. UNIT-V	Control function func	erators, Integers, Factors, Logical operators of Structures and Vectors  is, scoping rules, dates and times, Incter Strings, Matrices, Lists, Data Fracents of a vector using subscripts, Wating Vector Elements, Obtaining the ations, Vector Indexing, Common Vector and Data Frames  al List Operations, List Indexing Adding e Accessing List Components and Valence, Other Matrix-Like Operations  is and Tables and Object-Oriented statistical pattern recognition - Syntac Morphological transformation— dilation kening. S Classes, S Generic Function eneric Function on an S Class, visualization using R	atroduction ames, Cla /orking wit Length of or Operation and Deletin lues Apply Program in Program	to Functions to Functions to Functions.  Ing List Eling Functions  Ing	ements, on - optiming and cless, Using de profiling	eview of Somerating senterating senters, Scalars, es and Arranders of Periods: 9 Getting the Some senters of Scalars, Data Interiods: 9 Interiods: 9 Inheritance on Statistica Periods: 9	quences, Nectors, ays as Vectors, ays as Vectors, ays as Vectors, as Vectors, and a Vector and a	Vectors a Arrays, a ctors Vectors Vectors Vectors Vectors Vectors, Extended the eating Date of the eating Da	ed CO3			
UNIT-II Control structures Structures, Vector ubscripts, Extrac Matrices, Adding writhmetic and Log UNIT-III Lists: Creating List example: Text Co rames, Accessing UNIT-IV Knowledge repres Mathematical Morp keleton - thinning classes, Implementanipulation. UNIT-V Introduction, Type Mayanced Visualiz	Control function func	erators, Integers, Factors, Logical operators of Structures and Vectors  Is, scoping rules, dates and times, Incter Strings, Matrices, Lists, Data Fracents of a vector using subscripts, Wating Vector Elements, Obtaining the ations, Vector Indexing, Common Vector Indexing, Italian Indexing Adding the Accessing List Components and Values, Other Matrix-Like Operations  Is and Tables and Object-Oriented Statistical pattern recognition - Syntac Morphological transformation—dilation kening. S Classes, S Generic Function in S Class, visualization Using R  A Visualization using R  A Visualization, Statistical graphs: Scaing the ggplot2 package to visualize of the Index In	atroduction ames, Cla forking wit Length of an Operation and Deletingues Apply Program in — erosion ation, Simulater Plots, data, apply	to Funcesses Vector la Vec	ements, on a potential of the profile of the profil	eview of Somerating senterating senters, Scalars, es and Arranders of Scalars, Data I Periods: 9 Inheritance of Inheritance of Scalars, Statistical Periods: 9 er Plots and	quences, Vectors, vectors, ays as Vectors, ays as Vectors as Vectors and Vectors as Vectors and Vectors as Vectors and Vectors as Ve	Vectors a Arrays, a ctors Vectors Vectors Vectors Vectors Vectors, Extended the eating Date of the eating Da	ed CO3			
UNIT-II Control structures Structures, Vector ubscripts, Extrac Matrices, Adding writhmetic and Log UNIT-III Lists: Creating List example: Text Co rames, Accessing UNIT-IV Knowledge repres Mathematical Morp keleton - thinning classes, Implementanipulation. UNIT-V Introduction, Type Mayanced Visualiz	Control function func	erators, Integers, Factors, Logical operators of Structures and Vectors  s, scoping rules, dates and times, Incter Strings, Matrices, Lists, Data Fracents of a vector using subscripts, Wating Vector Elements, Obtaining the ations, Vector Indexing, Common Vector and Data Frames  al List Operations, List Indexing Adding e Accessing List Components and Valence, Other Matrix-Like Operations  s and Tables and Object-Oriented statistical pattern recognition - Syntac Merphological transformation— dilation kening. S Classes, S Generic Function eneric Function on an S Class, visualization using R  a Visualization using R  a Visualization, Statistical graphs: Scaling the ggplot2 package to visualize of data graphics for dynamic reporting, ad	attroduction ames, Cla forking wit Length of and Deletin lues Apply described and Program in a pattern and pattern are resistent as, Writing attorn, Simulater Plots, data, apply vantages, of	to Funcesses Vector a	ements, on a potential of the profile of the profil	eview of Somerating sectors, Scalars, es and Arra Periods: 9 Getting the States, Data I Periods: 9 Inization technosing -home Inheritance and, Statistica Periods: 9 er Plots and ggthemes to	quences, Vectors, vectors, ays as Vectors, ays as Vectors, ays as Vectors, as Vectors, Crames, Crames, Crames, S Classe al Analysis  Box and prefine and	Vectors a Arrays, a ctors Vectors Vectors Vectors Vectors Vectors, Extending Date of the Company	ed CO3			
UNIT-II Control structures Structures, Vector ubscripts, Extrac Matrices, Adding viithmetic and Log UNIT-III Lists: Creating List example: Text Co rames, Accessing UNIT-IV Cnowledge repres Mathematical Mory keleton - thinning classes, Implementanipulation. UNIT-V Introduction, Type Advanced Visualiz Charts and graphs,	Control function func	erators, Integers, Factors, Logical operators of Structures and Vectors  Is, scoping rules, dates and times, Income Strings, Matrices, Lists, Data Fracters of a vector using subscripts, Wating Vector Elements, Obtaining the ations, Vector Indexing, Common Vector Indexing, Italian Indexing Adding the Accessing List Components and Values, Other Matrix-Like Operations In Indexing I	attroduction ames, Cla forking wit Length of and Deletin lues Apply described and Program in a pattern and pattern are resistent as, Writing attorn, Simulater Plots, data, apply vantages, of	to Funcesses Vector a	ements, on a potential of the profile of the profil	eview of Somerating sectors, Scalars, es and Arra Periods: 9 Getting the States, Data I Periods: 9 Inization technosing -home Inheritance and, Statistica Periods: 9 er Plots and ggthemes to	quences, Vectors, vectors, ays as Vectors, ays as Vectors, ays as Vectors, as Vectors, Crames, Crames, Crames, S Classe al Analysis  Box and prefine and	Vectors a Arrays, a ctors Vectors Vectors Vectors Vectors Vectors, Extended the eating Date of the eating Da	ed cos			

#### Reference Books

- 1. Garrett Grolemund, Hadley Wickham,"Hands-On Programming with R: Write Your Own Functions and Simulations",2018
- Venables, W.N., and Ripley, "S programming", Springer, 2019.
- Roger D. Peng," R Programming for Data Science ", 2016
   Norman Matloff, "The Art of R Programming- A Tour of Statistical Software Design", 2018
- Jd long, Paul Teetor, "R Cookbook 2e: Proven Recipes for Data Analysis, Statistics, and Graphics", O'Reilly, 2019.

#### Web References

- https://www.r-project.org/about.html
- https://www.tutorialspoint.com/r/index.htm
- https://www.javatpoint.com/r-tutorial

### COs/POs/PSOs Mapping

COs		Progra	m Out	Program Specific Outcomes (PSOs)					
	P01	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	3	2	92 <b>—</b> 03	-		1	2	5-1
2	3	3	3	-	1	-	2	2	1
3	2	3	2	1	2	-	2	2	1
4	3	3	3	1	3		2	2	1
5	3	3	3	1	3	-	2	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

ASSESSMENT		Conti	nuous As	End Semester Examination (ESE) Marks	Total Marks		
	CAT 1	CAT 2	Model Exam	Assignment	Attendance	90 mil.	
Marks		10	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	Artificial Intelligence and Data Scienc	e Program	me: M	.Tech.				
Semester	II - CARRO Assants but a records at	Course (	Catego	ry: PE	End	Semester	Exam Ty	pe: <b>TE</b>
Course Code	P23ADE213	Per	iods / \	Week	Credit	N	/laximum	Marks
		L	T	P	С	CAM	ESE	TM
Course Name	Full Stack Development	3	773	14-1-15	3	40	60	100
- aller		(Al &DS)		<u> </u>				terapo por esta esta
Prerequisite	Basics in Java Programming			E. E. E.	4,221			
	On completion of the course, the stud	ents will be	able t	0		1	BTM	apping
							(Highe	st Level
Course Outcomes	CO1 Understand the syntax, control str	ructure, and	data si	tructure	of Java pro	gramming.	ŀ	₹2
Outcomes	CO2 Understand the database connect	tivity to creat	e real-	life or bu	ısiness solu	ıtions.		<b>&lt;</b> 2
	CO3 Understand the J2EE Architecture	e and develo	p the v	veb appl	ication.		ŀ	<b>&lt;</b> 3
	CO4 Use Object Relation Mapping usir	ng Hibernate	to bui	ld the da	tabase.		e jeur i i	<b>&lt;</b> 3
	CO5 Design and develop the web appli	ication using	Spring	a MVC.				<b>(</b> 3
UNIT-I	Introduction to Programming				Periods: 9			
	va Programming: Basic constructs of OOPS -	- Data types	- Oper	ators and	control stat	ements - (	Classes ar	nd
Methods – Inherita	nce and Packages	Harm Trans						CO
exception nandling	g: Fundamental of Exceptions – Types of Exce	eptions – Multi	tnreade	ea progra	mming and I	<i>i</i> O.		
UNIT-II	JDBC Programming				Periods: 9			
The JDBC Conne	ctivity Model - Database Programming - Cor	nnecting to th	e Datal	base - C	reating a SC	L Query -	Getting th	ne CO2
Results - Updatin	Database Data - Error Checking and the S	QL Exception	Class	- The SC	L Warning	Class - The	Stateme	nt
nterface - Prepa	red Statement - Callable Statement - The F	Result Set In	erface	- Updat	able Result	Sets - JDE	BC Types	4
	eries – Result Set Meta Data – Executing SQI	L Updates – T	ransac	tion Mana				
	J2EE and Web Development	***************************************			Periods: 9			
	Types - J2EE Containers - Types of Serv						<ul><li>Reque</li></ul>	1
Processing in viver	Application – Web Application Structure – We	eb Containers	and vv	eb Archit	ecture Mode	IS.		CO
UNIT-IV	Hibernate		************		Periods: 9			
ntroduction to Hit	i pernate – Exploring Architecture of Hibernate	- Object Re	lation	Mapping			- Hiberna	te CO4
	nate Query Language (HQL), CRUD Operatio				, the desired a property			
UNIT-V	Java Web Frameworks: Spring MVC		-		Periods: 9			
	n – Architecture – Spring MVC – Module –	Life Cycle	of Boor	Factory			Injection	CO.
	ion – Inner Beans – Aliases in Bean – Bean S							
	action Management - CRUD Operation using I						٠,3 -،	
Lecture Po	eriods: 45 Tutorial Periods: -	Pra	ctical	Periods	: -	Total	Periods:	45
Text Books								
	Schildt, "Complete Reference Java", Mcgra							
2. Cay. S F	lortsmann and Gray Cornell, "Core Java: '	Volume II -	Advan	ced Fea		son, 8 <sup>th</sup> ed	dition, 200	08.
<ol> <li>Cay. S F</li> <li>Deitel ar</li> </ol>	lortsmann and Gray Cornell, "Core Java: ad Deitel, "Java How to Program", Prentice	Volume II -	Advan	ced Fea		rson, 8 <sup>th</sup> ed	dition, 200	08.
2. Cay. S F 3. Deitel ar Reference Book	lortsmann and Gray Cornell, "Core Java: ad Deitel, "Java How to Program", Prentice as	Volume II – e Hall, 10 <sup>th</sup> e	Advan dition,	ced Fea 2016.		rson, 8 <sup>th</sup> ed	dition, 200	08.
<ol> <li>Cay. S F</li> <li>Deitel ar</li> <li>Reference Book</li> <li>Herbert</li> </ol>	lortsmann and Gray Cornell, "Core Java: id Deitel, "Java How to Program", Prentice s s Schildt, "Java: A Beginner's Guide", Oracl	Volume II – e e Hall, 10 <sup>th</sup> e le Press, 6 <sup>th</sup>	Advandition,	ced Fea 2016. , 2014.	ures", Pear			
2. Cay. S F 3. Deitel ar Reference Book 1. Herbert 2. Mayden	lortsmann and Gray Cornell, "Core Java: ad Deitel, "Java How to Program", Prentice as	Volume II – e e Hall, 10 <sup>th</sup> e le Press, 6 <sup>th</sup>	Advandition,	ced Fea 2016. , 2014.	ures", Pear			
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COs		Progra	m Out	Program Specific Outcomes (PSOs)					
as li	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	2	2	1	2	2	3	2	2
2	1	2	2	2	2	2	3	2	2
3	2	3	3	1.1	3	3	3	3	3
4	2	3	3	1	3	3	3	3	3
5	2	3	3	1	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment		Continu	ous Asse	CAM)	End Semester	Total	
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	en i d	0	15	10	5	60	100

<sup>\*</sup> Application oriented / Problem solving / Design / Analytical in content beyond the syllabus