LNCT UNIVERSITY, BHOPAL

Programme:- BCA (CA)　　　　**Semester – VII**　　　　**wef: July 2025**

Name of Paper & Category	Paper Code	Theory					
		Credit			Marks		
		L	**T**	**J**	**EST**	**CAT**	**Total**
Big Data Analytics (Major-core)	**BCA-701**	3	1	0	70	30	100

Course Objective	The Objective of this course enable students to proficiently analyze large-scale datasets using advanced techniques and tools in Big Data analytics, fostering a deep understanding of data processing, machine learning, and decision-making for informed business insights.

Units	Contents (*Theory*)	Hours /week
I	**Understanding Big Data:** Introduction to big data, convergence of key trends, unstructured data, industry examples of big data, big data applications, big data technologies, introduction to Hadoop, open source technologies, mobile business intelligence, Crowd sourcing analytics, inter and trans firewall analytics.	**8**
II	**NoSQL Data Management:** Introduction to NoSQL – aggregate data models – key-value and document data models -relationships – graph databases – schemaless databases – materialized views – distribution models – master-slave replication – consistency – Cassandra – Cassandra data model -Cassandra examples – Cassandra clients.	**8**
III	**Basics of Hadoop:** Data format – analyzing data with Hadoop – scaling out – Hadoop streaming – Hadoop pipes -design of Hadoop distributed file system (HDFS) – HDFS concepts – Java interface – data flow -Hadoop I/O – data integrity – compression – serialization – Avro – file-based data structures -Cassandra – Hadoop integration.	**8**
IV	**Hadoop Related Tools:** Hbase – data model and implementations – Hbase clients – Hbase examples – praxis. Pig – Grunt – pig data model – Pig Latin – developing and testing Pig Latin scripts.	**8**
V	**Hive** – data types and file formats – HiveQL data definition – HiveQL data manipulation – HiveQL queries **Spark** - Overview of Spark – Hadoop Overview of Spark – Hadoop vs. Spark – Cluster Design – Cluster Management – performance.	**8**

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Text Books/ Reference Books:-			
Name of Authors	**Titles of the Book**	**Edition**	**Name of the Publisher**
Subhashini Chellappan Seema Acharya	Big Data and Analytics	1st Edition 1996	Wiley
Benjamin Bengfort and Jenny Kim	Data Analytics with Hadoop An Introduction for Data Scientists	2016	O'Reilly
V.K Jain	Big Data and Hadoop	1st Edition 2018	Khanna Publishing

COURSE OUTCOMES: Students will be able to	
CO1	Describe big data and use cases from selected business domains.
CO2	Explain NoSQL big data management.
CO3	Install, configure, and run Hadoop and HDFS and perform map-reduce analytics using Hadoop.
CO4	Use Hadoop-related tools such as HBase, Cassandra, and Pig.
CO5	Proficient in managing and manipulating data using Hive and uses of Spark.

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Name of Paper & Category	Paper Code	Theory					
		Credit			Marks		
		L	T	J	EST	CAT	Total
Data Mining (Major-DSE)	**BCA-702**	3	1	0	70	30	100

Course Objective	This course will introduce the concepts of data ware house and data mining, which gives a complete description about the principles, used, architectures, applications, design and implementation of data mining and data ware housing concepts.

Units	Contents (*Theory*)	Hours /week
I	**Data Warehousing**: History of Data Warehouses; Concepts; Benefits; Comparison of OLTP and Data Warehousing, Data Marts.	**8**
II	**Principles of Dimensional Modeling**: Objectives; Requirements to Data Design; STAR Schema: concept of Keys, Advantages. Dimensional Modeling: Updates to the Dimension tables; miscellaneous dimensions; SNOWFLAKE schema; Aggregate fact tables; Families of STARS.	**8**
III	**Data Warehousing Architecture**: Data: Operational, Store, Detailed, Lightly and Highly summarized, Metadata; Archive/Backup; Manager: Load, Warehouse, Query; Architecture models: 2, Tier, 3 Tier and 4 Tier.	**8**
IV	**OLAP**: Definitions, Rules, Characteristics, Features and functions, Dimensional analysis; Hypercube; Drill, Down and Rollup; Slice, and, Dice or Rotation; OLAP Models.	**8**
V	**Data Mining**: Definition; Knowledge discovery process (KDP); OLAP vs. Data mining; Data mining vs. Data warehouse; Major data mining techniques; Cluster detection; Decision trees; Memory based reasoning; Neural networks; Genetic algorithms; Applications; Benefits.	**8**

Text Books/ Reference Books:-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Pieter Adriaans, Dolf & Zantinge	Data mining	1996	Addison Wesley
Sam Anahory & Dennis Murray	Data Warehousing in real world	1997	Addison Wesley
Paulraj Ponniah	Data Warehousing: Fundamentals for IT Professionals	2012, Second Edition	Wiley India Pvt Ltd.
Mark Hall, Ian Witten and Eibe Frank	Data Mining: Practical Machine Learning Tools and Techniques	2011, Third edition	Morgan Kaufmann Publisher

COURSE OUTCOMES: Students will be able to

CO1	Understand the functionality of the various data mining and data warehousing components.
CO2	Have a deeper understanding of database systems and their underlying theory to be able to improve the decision-making process
CO3	Compare different approaches of data ware housing and data mining with various technologies.
CO4	To evaluate the different models of OLAP and data preprocessing.
CO5	To develop ability to design various algorithms based on data mining tools and describe the designing of Data Warehousing so that it can be able to solve the root problems.

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Name of Paper & Category	Paper Code	Theory					
		Credit			Marks		
Research Methodologies (Minor- Research Methodology)	BCA-703	L	T	J	EST	CAT	Total
		3	1	0	70	30	100

Course Objective	Equip students with the necessary skills to conduct rigorous and ethical research in their respective fields.

Units	Contents (*Theory*)	Hours /week
I	**Introduction to Research Methodology:** Definition and purpose of research**,** Types of research (qualitative, quantitative, mixed-methods)**,** Research process and steps. **Research Problem Identification:** Research problem formulation**,** Research questions and hypotheses**,** Literature review and identifying research gaps.	8
II	**Research Design:** Experimental design**,** Survey design**,** Case study design**,** Ethnographic design**,** Sampling techniques**,** Data collection methods.	8
III	**Research Ethics and Legal Considerations:** Ethical principles in research**,** Informed consent and participant rights**,** Institutional review boards and ethical clearance, Intellectual property rights and plagiarism.	8
IV	**Research Proposal and Project Management:** Research proposal writing**,** Project planning and scheduling**,** Resource allocation and management. **Writing and Presenting Research:** Research paper structure and organization**,** Academic writing style and citation guidelines**,** Presentation skills and techniques	8
V	**Advanced Research Methodologies:** Mixed-methods research**,** Case study research, Action research**,** Longitudinal and cross-sectional studies**,** Meta-analysis and systematic reviews.	8

Text Books/ Reference Books:-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Ranjit Kumar	A Step-by-Step Guide for Beginners" by	2021	SAGE Publications
C.R. Kothari	Methods and Techniques	2013	New Age International Publishers
Prasanta Kumar Das	A Step-by-Step Guide for Scientists	2016	Springer
Deepak Chawla	Concepts and Cases	2016	Vikas Publishing House
Wayne C. Booth, Gregory G. Colomb, and Joseph M. Williams	The Craft of Research	2008	University of Chicago Press

COURSE OUTCOMES: Students will be able to

CO1	Identify research problems and formulate relevant research questions.
CO2	Develop proficiency in selecting and designing appropriate research methodologies and designs to address research questions and objectives effectively.
CO3	Ensure the responsible conduct of research and protection of participant rights.
CO4	Acquire skills in preparing well-structured research proposals, managing research projects efficiently.
CO5	Address complex research problems in various disciplines.

Name of Paper & Category	Paper Code	Practical				
		Credit		Marks		
		P	J	ESP	CAP	Total
Programming Lab in Big Data Analytics (Major-core)	**BCA-704**	2	-	70	30	100

Contents (Practical):

1. Installing and configuring the Hadoop frame work. HDFS Commands,

2. Map Reduce Program to show the need of combiner

3. Map Reduce I/O Formats – Text, Key – Value

4. Map Reduce I/O Formats – NLine – Multiline

5. Installing and Configuring Apache PIG and HIVE

6 Sequence File Input / Output Formats

7. Distributed Cache & Map side Join, Reduce Side Join

8. Building and Running Spark Application

9. Word count in Hadoop and Spark

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Name of Paper & Category	Paper Code	Practical				
		Credit		Marks		
		P	J	ESP	CAP	Total
Major Project (Field)	**BCA-705**	-	10	200	100	300

Contents (Practical)

Process: - Project Guide of the project will be allotted by Director/Head of Department. Any related technology can be chosen for development of Project. It is to be done in Industry/Organisation.

Evaluation parameters are:

- Problem Statement and Objective
- Technical Implementation
- Functionality and Features
- User Interface and Experience
- Data Management and Database
- Design Documentation
- Testing and Quality Assurance
- Innovation and Creativity
- Project Presentation
- Overall Project Outcome