

Anekant Education Society's
Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati.
(Autonomous)
SYLLABUS STRUCTURE OF
Bachelor of Business Administration (Computer Application)
Syllabus (CBCS Pattern) under Academic Autonomy for the year 2021-2022
T.Y.BBA (C.A)(2019-Pattern)

Semester –VI (w.e.f.A.Y.2021-2022)

Subject Code	Subject Name	Marks			Credit
		Int	Ext	Total	
BCA3601	Data Analytics using Python	40	60	100	03
BCA3602	NOSQL Databases	40	60	100	03
BCA3603A BCA3603B	Elective: Big Data Block Chain	40	60	100	03
BCA3604A BCA3604B	Elective : Data Mining Deep Learning	40	60	100	03
BCA3605	Project	-	-	100	04
BCA3606	Computer Laboratory based on (3601)	40	60	100	02
BCA3607	Computer Laboratory based on (3602)	40	60	100	02
	Certificate Course	-	-	-	02
Total		240	360	700	22

BBA (C.A) Programme Outcome

PSO1. Knowledge: To understand and apply the fundamental principles, concepts, and methods in diverse areas of computer science, computer applications, management, mathematics, statistics, etc.

PSO2. Problem Analysis: Identify, analyse and formulate complex real-life computing problems. Attain substantiated conclusions to solve the problems using fundamental principles of computer science and application domains by using various tools and emerging technologies.

PSO3. Design and Development: Design and develop efficient solutions for complex real-world computing problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety and the cultural, societal, and environmental considerations.

PSO4. Conduct investigations of complex problems: Ability to research, analyze and investigate complex computing problems through the design of experiments, analysis, and interpretation of data, and synthesis of the information to arrive at valid conclusions.

PSO5. Modern Tool Usage: Create, identify and apply appropriate techniques, skills, and modern computing tools to computing activities.

PSO6. Ethics and Social Responsibility: Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.

PSO7. Individual and Team Work: Ability to work effectively as an individual, and as a member or leader as per need in, multidisciplinary teams.

PSO8. Life-Long Learning: Recognize the need and have the ability to engage in independent continuous reflective learning in the context of technological advancement.

PSO9. Project Management: Understand and apply computing, management principles to manage projects.

PSO10. Communication: Able to use interpersonal skills and communicate effectively with the professionals and with society to convey technical information effectively and accurately and able to comprehend and write effective reports, design documentation, and make effective presentations.

PSO11. Innovation, employability, and Entrepreneurial skills:

Identify opportunities, and pursue those opportunities to create value and wealth for the betterment of the individual and society at large.

SYLLABUS (CBCS) FOR T.Y.BBA (C.A.) (w. e. from June, 2021)

Academic Year 2021-2022 Class : T.Y.BBA

(C.A.) (Semester - VI) Paper Code : BCA3601

Title of Paper: Data Analytics using python

Credit: 3

No. of. Lectures: 48

A] Course Objectives:

1. To develop relevant Programming abilities.
2. To demonstrate Proficiency with Statistical Analysis of Data.
3. To develop the ability to build and Assess Data-based Models.
4. To demonstrate Skill in Data Management.
5. To apply Data Science Concepts and Methods to solve Problems in real-world contexts and will Communicate these solutions effectively

B] Course Outcome:

By the end of the course, students will be able to:

CO1.Demonstrate proficiency in using Python for data analytics.

CO2.Develop effective data visualization skills for conveying insights.

CO3.Effectively communicate insights through charts, graphs, and plots.

CO4.Apply statistical methods to analyze and interpret data.

CO5.Clean and preprocess data to handle missing values and outliers.

CO6.Apply simple machine learning algorithms for tasks like regression and classification.

CO7.Apply learned skills to a real-world data analytics project.

Topic/Contents

Unit 1: Introduction to Data Science and Basics of Data (12L)

1.1 What is Data Science?

1.2 Data Science Process

1.3 Stages in Data Science Project

1.4 Basics of Data Analytics

1.5 Types of Analytics –

Descriptive, Predictive, Prescriptive

1.6 Statistical Inference

1.7 Populations and Samples

1.8 Statistical Modelling

1.9 Probability

1.10 Distribution

1.11 Correlation

1.12 Regression

- Unit 2: Introduction to Machine Learning** (12L)
- 2.1 Basics of Machine Learning
 - 2.2 Supervised Machine Learning K- Nearest-Neighbours, Naïve Bayes Decision Tree Support Vector Machines
 - 2.3 Unsupervised Machine Learning, Cluster Analysis, K means, Association Rule Mining
 - 2.4 Apriori Algorithms
 - 2.5 Regression Analysis
Linear Regression, Nonlinear Regression
- Unit 3: Data Analytics with Python Programming Numpy** (12L)
- 3.1 Arrays
 - 3.2 Array indexing
 - 3.3 Datatypes
 - 3.4 Array math o Broadcasting
 - 3.5 SciPy
 - 3.6 Image Operations
 - 3.7 Distance between Point
 - 3.8 Data Analysis and Manipulation using Pandas-
Importing Data
Creating A Data Frame
Data Frame Methods
Indexing Data Frames
Boolean Indexing
Indexing Using Labels
Multi-Indexing
Merge Data Frames
Sorting Data Frames
Apply Function Pivot
Table Crosstab
Iterating over rows of a Data Frame
- Unit 4: Data Visualization** (12L)
- 4.1 Basic Principles
 - 4.2 Ideas and tools for Data Visualization Graph
 - 4.3 Visualization
 - 4.4 Data Summaries
 - 4.5 Model Checking & Comparison
 - 4.6 Purpose of Visualization
 - 4.7 Multidimensional Visualization
 - 4.8 Tree Visualization
 - 4.9 Graph Visualization
 - 4.10 Visualization Techniques
 - 4.11 Understanding Analytics output and their usage
 - 4.12 Scikit Package
 - 4.13 matplotlib Library
 - 4.14 Plotting
 - 4.15 Subplots Image

Reference Books:

1. The elements of statistical learning. Hastie, Trevor, et al., Vol. 2. No. 1. New York: springer, 2009.
2. Applied statistics and probability for engineers. Montgomery, Douglas C., and George C. Runger. John Wiley & Sons,2010
3. Scaling up Machine Learning to White “Hadoop: The Definitive Guide” Third Edition, Bekkerman et al., O’reilly Media, 2012.
4. “Mining of Massive Datasets”, Anand Rajaraman and Jeffrey David Ullman, Cambridge University Press, 2012. 5. Developing Analytic Talent: Becoming a Data Scientist, Vincent Granville, wiley, 2014

Class: TYBBA (C.A) (Sem VI)
Course: Data Analytics using python

Subject: BBA (C.A)
Course Code: BCA3601

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	Programme Outcomes (POs)										
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11
CO 1	2										
CO 2			3							2	
CO 3											
CO 4		2		2	2						
CO 5				3							
CO 6			3								
CO7								3	2		3

PO1. Knowledge:

CO1 strongly mapped as it contributes to the development of students' disciplinary knowledge in also Proficiency in Python is a fundamental skill for data analysts. It provide a strong foundation in programming.

PO2. Problem Analysis:

CO4 Moderately mapped as the Students will able to apply statistical methods to analyze and interpret data.

PO3. Design and Development:

CO2 CO6 Strongly mapped as the students will be able to develop effective data visualization skills and apply simple machine learning algorithms.

PO4. Conduct investigations of complex problems:

CO5 strongly mapped as student will be able to conduct the investigation of real word data and design and develop models using regression classification. CO4 Moderately mapped as the Students will apply statistical methods to analyze and interpret data

PO5. Modern Tool Usage:

CO4 moderately mapped student will create different models of ML using algorithms as Modern tool

PO8. Life-Long Learning:

CO7 strongly mapped as it contributes to the development of students' ability to engage in life-long learning.it goal is producing graduates who can work with real-world data.

PO9. Project Management:

CO7 moderately mapped as student can create models with real word data.

PO10. Communication:

CO2 moderately mapped as it aligns with the program's focus on developing both analytical and communication skills in term of ML

PO11. Innovation, employability, and Entrepreneurial skills:

CO7 strongly relate to employability skills as students are able to prepare real-world applications of data analytics, aligning with the program's focus on practical, industry-relevant skill.

SYLLABUS (CBCS) FOR T.Y.BBA (C.A.) (w. e. from June, 2021)

Academic Year 2021-2022

Class : T.Y.BBA (C.A.) (Semester - VI)

Paper Code : BCA3602

Title of Paper: NOSQL Databases

Credit: 3

No. of. Lectures: 48

A] Course Objectives:

1. Students will understand fundamental Concepts of a number of different NOSQL products.
2. Students will also comprehend with advanced topics like Google App Engine Data store and Amazon Simple DB.
3. Students will also learn various CRUD operations and the querying Mechanisms in NOSQL
4. Students will learn how to model data and design schemas in a NoSQL context.

B] Course Outcome:

By the end of the course, students will be able to:

CO1. Assimilate fundamental concepts in the context of a number of different NOSQL products.

CO2. Construct refined Logical Database Model with consideration of Data Semantics and dependency.

CO3. Execute various CRUD operations with MongoDB.

CO4. Build a database System and demonstrate competence with the fundamental tasks involved with its Modeling, Designing, and Implementation.

CO5. Use the MongoDB tools to develop and deploy your Applications.

CO6. Implement Java/ Python / PHP web Application for a real world Problem with MongoDB.

CO7. Explore various types of NoSQL databases, such as document-oriented, key-value stores, column-family stores, and graph databases.

Topic/Contents

Unit 1:	Introduction to NOSQL 1.1 Definition of NOSQL 1.2 History of NOSQL and different NOSQL Products 1.3 Exploring Mongo DB java 1.4 Exploring Mongo DB Ruby/Python 1.5 Interfacing and Interacting with NOSQL	(10L)
Unit 2:	NOSQL Basics 2.1 Understanding the NOSQL Architecture 2.2 Performing CRUD operations 2.3 Querying NOSQL Stores 2.4 Modifying Data Stores and Managing Evolution 2.5 Indexing and Ordering 2.6 DataSets.	(10L)

Unit 3:	Advanced NOSQL	(09L)
	3.1 NOSQL in Cloud	
	3.2 Parallel Processing with Map Reduce	
	3.3 Big Data with Hive	
Unit 4:	Working with NOSQL	(09L)
	4.1 Surveying Database	
	4.2 Migrating from RDBMS to NOSQL	
	4.3 Web Frameworks and NOSQL	
	4.4 Using MYSQL as a NOSQL	
Unit 5:	Developing Web Application with NOSQL and NOSQL Administration	(10L)
	5.1 PHP and MongoDB	
	5.2 Python and MongoDB	
	5.3 Creating Blog application with PHP	
	5.4 NOSQL Database Administration	

Reference Books:

1. David Hows, “The definitive guide to MongoDB”, 2nd edition, Apress Publication, 2009, 8132230485.
2. Shakuntala Gupta Edward, “Practical Mongo DB ”, Second edition, Apress Publications, 2016, ISBN 1484206487
3. Daniel Perkins, “MongoDB, Third Edition, CreateSpace Independent Publishing Platform, 2016, ISBN 152396300
4. Steve Hoberman, “Data Modelling for Mongo DB”, First Edition, Technics Publication, 2014, ISBN 978193550

Class: TYBBA (C.A) (Sem VI)
Course: NOSQL Database

Subject: BBA (C.A)
Course Code: BCA3602

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	Programme Outcomes (POs)										
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11
CO 1	3										
CO 2			3								
CO 3			3		3			3			
CO 4			3								
CO 5									3		
CO 6		3									
CO7	2										

PO1. Knowledge:

CO1 CO7 is strongly mapped as it contributes to the development of students' disciplinary knowledge (Explore various types of NoSQL databases), as it requires students to understand the fundamental concepts of different NoSQL databases.

PO2. Problem Analysis:

CO6 is strongly mapped to enable students to apply logical database modeling

PO3. Design and Development:

CO2 CO3 CO4 is strongly mapped as the students will be able to the practical application of CRUD operations using MongoDB. This aligns with CO4 Design and conducts experiments, as well as analyses and interprets data, as it involves the design and implementation of a database system.

PO5. Modern Tool Usage:

CO3 is moderately mapped Students will create different practical applications of CRUD operations using MongoDB.

PO8. Life-Long Learning:

CO3 is strongly mapped as it contributes to the development of students' ability to engage in life-long learning. Its goal is to produce graduates who can work with real-world data.

PO9. Project Management:

CO5 is moderately mapped as students can create unstructured databases with real word data.

SYLLABUS (CBCS) FOR T.Y.BBA (C.A.) (w. e. from June, 2021)

Academic Year 2021-2022

Class : T.Y.BBA (C.A.) (Semester - VI) Paper Code: BCA3603A

Title of Paper: Big Data

Credit: 3

No. of. Lectures: 48

A] Course Objectives:

1. Understand the Big Data Platform and its Use cases
2. Provide an overview of Apache Hadoop
3. Provide HDFS Concepts and Interfacing with HDFS
4. Understand Map Reduce Jobs
5. Provide Exposure to Data Analytics with R.
6. To explore various techniques for mining data stream.

B] Course Outcome:

By the end of the course, students will be able to:

CO1. Understand Big Data and Data analysis.

CO2. Understand the role of Hadoop in distributed storage and processing

CO3. Comprehend the principles of distributed computing and understand how distributed computing is applied in Big Data systems.

CO4. Access and Process Data on Distributed File System Manage Job Execution in Hadoop Environment.

CO5. To give the practical enhancement of visualization techniques.

CO6. Explore storage solutions for Big Data, including distributed file systems.

CO7. Learn about technologies that enable real-time data processing.

Topic/Contents

Unit 1: Introduction to Big Data (04L)
1.1 Introduction to Big Data
1.2 Types of Digital Data
1.3 Big Data Analytics
1.4 Application of Big Data

Unit 2: Big Data Processing (12L)
2.1 Big Data Technologies
2.2 Google File System
2.3 Hadoop Eco System
2.4 Hadoop Architecture
2.5 Hadoop storage: HDFS
2.6 Hadoop Shell commands
2.7 HDFS read write operations, Name Node, Secondary Name Node and Data Node, MapReduce Job, Task tracker

- Unit 3: HIVE QL** (10L)
3.1 Data Types and File Formats
3.2 Databases in Hive
3.3 Hive QL:
Data Definition, Data Manipulation, Queries, Views,
Indexes, Schema Design
- Unit 4: Data Analysis Using R And Hadoop** (12L)
4.1 Features of R language
4.2 R and Hadoop Integrated Programming Environment
(RHIPE) Introduction, Architecture of RHIPE, RHIPE
function reference, Architecture of R Hadoop, R Hadoop
function reference
- Unit 5: Big data and Machine Learning** (10L)
Machine Learning tools: Spark and SparkML

Reference Books:

1. Scaling up Machine Learning to White “Hadoop: The Definitive Guide” Third Edition, Bekkerman et al., O’reilly Media, 2012.
2. “Mining of Massive Datasets”, Anand Rajaraman and Jeffrey David Ullman, Cambridge University Press, 2012. 5. Developing Analytic Talent: Becoming a Data Scientist, Vincent Granville, wiley, 2014
3. Tom White “ Hadoop: The Definitive Guide” Third Edit on, O’reily Media, 2012. • Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.
4. Prajapati, V. Big data analytics with R and Hadoop. Packt Publishing Ltd, 2013

Class: TYBBA (C.A) (Sem VI)
Course: Big Data

Subject: BBA (C.A)
Course Code: BCA3603A

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	Programme Outcomes (POs)										
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11
CO 1	3										
CO 2	3										
CO 3	3										
CO 4		2									
CO 5			3		3						
CO 6					3			3			
CO7									3		3

PO1. Knowledge:

CO1 CO2 CO3 are strongly mapped as they contribute to the development of students' disciplinary knowledge also Proficiency as it involves the foundational understanding of big data and data analysis concepts.

PO2. Problem Analysis:

CO4 is strongly mapped as it involves practical skills in accessing and processing data in a distributed file system and managing job execution in a Hadoop environment.

PO3. Design and Development:

CO5 is strongly mapped as the students will be able to develop effective data visualization skills and apply different techniques.

PO5. Modern Tool Usage:

CO5 CO6 is moderately mapped it involves the practical application of visualization techniques to enhance the understanding and interpretation of data using different tools.

PO8. Life-Long Learning:

CO6 is strongly mapped as it contributes to the development of students' ability to engage in life-long learning. Its goal is to produce graduates who can work with real-world data.

PO9. Project Management:

CO7 is moderately mapped as students can create models with real word data.

PO11. Innovation, employability, and Entrepreneurial skills:

CO7 strongly relates to employability skills as students can prepare real-world applications of big data. It helps to learn about technologies that enable real-time data processing, which is crucial in team-based projects in the context of big data systems.

SYLLABUS (CBCS) FOR T.Y.BBA (C.A.) (w. e. from June, 2021)

Academic Year 2021-2022

Class : T.Y.BBA (C.A.) (Semester - VI) Paper Code : BCA3603B

Title of Paper: Block Chain

Credit: 3

No. of. Lectures: 48

A] Course Objectives:

Student should be able

- 1 To Understand How Block Chain Systems (mainly Bitcoin and Ethereum) work,
2. To Securely interact with block chain system.
3. To Learn the basics of cryptography as it relates to block chain technology.
4. To Design, build, and Deploy smart contracts and Distributed Applications
5. To integrate ideas from block chain Technology into their own Projects.

B] Learning Outcome:

By the end of the course, students will be able to:

CO1. Demonstrate a clear understanding of the foundational concepts of block chain technology.

CO2. Explain the decentralized and distributed nature of block chain networks.

CO3. Evaluate different consensus mechanisms used in block chain networks.

CO4. Understand regulatory challenges and considerations in the block chain space.

CO5. Identify and understand emerging technologies with potential implications for block chain development.

CO6. Demonstrate the ability to explain complex block chain ideas to diverse audiences.

CO7. Illustrates to use cryptographic hash functions, public-private key pairs, and digital signatures in a block chain context.

Topic/Contents

Unit 1:	Introduction to Blockchain	(12L)
	1.1 Digital Trust	
	1.2 Asset	
	1.3 Transactions	
	1.4 Distributed Ledger Technology	
	1.5 Types of Network	
	1.6 Components of blockchain or DLT	
	1.7 Ledger	
	1.7.1. Blocks	
	1.7.2. Blockchain	
	1.8 PKI and Cryptography	
	1.8.1. Private keys	
	1.8.2. Public keys	
	1.8.3. Hashing	
	1.8.4. Digital Signature	
	1.9. Consensus	
	1.9.1. Byzantine Fault	
	1.9.2. Proof of Work	
	1.9.3. Poof of Stake	

	1.9.4.	
	1.10. Security	
	1.10.1.DDoS	
	1.11 Cryptocurrency	
	1.12.Digital Token	
	How Blockchain Works	
Unit 2:	2.1 How Block chain Works	(12L)
	2.2. Structure of Blockchain	
	2.3. Block	
	2.4. Hash	
	2.5. Blockchain	
	2.6. Distributed	
	2.7. Lifecycle of Blockchain	
	2.8. Smart Contract	
	2.9. Consensus Algorithm	
	2.10 Proof of Work	
	2.11 Proof of Stake	
	2.12 Practical Byzantine	
	2.13 Fault Tolerance	
	2.14 Actors of Blockchain	
	2.15 Blockchain Developer	
	2.16 Blockchain Operator	
	2.17 Blockchain Regulator	
	2.18 Blockchain User	
	2.19 Membership Service Provider	
	2.20 Building a Small Blockchain Application	
Unit 3:	Introduction to Bitcoin	(08L)
	3.1 Currency	
	3.2 Double Spending	
	3.3 Cryptocurrency	
	3.4 P2P Payment Gateway	
	3.5 Wallet	
	3.6 Mining	
Unit 4:	Ethereum	(08L)
	4.1. Ethereum Network	
	4.2. EVM	
	4.3. Transaction Fee	
	4.4.Mist	
	4.5. Ether, Gas	
	4.6. Solidity - Smart Contracts	
	4.7.Truffle	
	4.8. Web3	
	4.9. Design and Issue Cryptocurrency	
	4.10. Mining	
	4.11. DApps	
	4.12. DAO	
Unit 5:	Introduction to Hyperledger Fabric V1	(08L)
	5.1. Introduction to Hyperledger	
	5.2 What is Hyperledger	

- 5.3 Why Hyperledger
- 5.4 Where can Hyperledger be used
- 5.5 Hyperledger Architecture
- 5.6 Membership
- 5.7 Blockchain
- 5.8 Transaction
- 5.9 Chaincode
- 5.10 Hyperledger Fabric
- 5.11 Features of Hyperledger

Reference Books:

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).
2. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies
3. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System
4. DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger,"Yellow paper.2014.
5. Nicola Atzei, Massimo Bartoletti, and TizianaCimoli, A survey of attacks on Ethereum smart contracts

Class: TYBBA (C.A) (Sem VI)
Course: Block Chain

Subject: BBA (C.A)
Course Code: BCA3603B

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	Programme Outcomes (POs)										
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11
CO 1	3										
CO 2	3										
CO 3		2		3							
CO 4	3							2			
CO 5		3									
CO 6	3				3						
CO7									3		

PO1. Knowledge:

CO1 CO2 CO4 CO6 are strongly mapped as they contribute to the development of students' disciplinary knowledge and also involve the foundational understanding of block chain technology, which is fundamental to the discipline.

PO2. Problem Analysis:

CO3 CO5 is moderately mapped as the Students will be able to explore and understand emerging technologies relevant to the field of block chain development.

PO4. Conduct investigations of complex problems:

CO3 is strongly mapped as students will be able to investigate real-world data as it involves the application of knowledge to assess and choose consensus mechanisms in block chain networks.

PO5. Modern Tool Usage:

CO6 is moderately mapped it involves communication skills and the ability to convey complex technical concepts to diverse audiences, which is essential for collaboration in the field.

PO8. Life-Long Learning:

CO4 is strongly mapped as it contributes to the development of students' ability to engage in life-long learning. Its goal is to produce graduates who can work with real-world data.

PO9. Project Management:

CO7 is moderately mapped as students can create models with real-world data.

SYLLABUS (CBCS) FOR T.Y.BBA (C.A.) (w. e. from June, 2021)

Academic Year 2021-2022

Class : T.Y.BBA (C.A.) (Semester - VI) Paper Code: BCA3604A

Title of Paper: Data Mining

Credit: 3

No. of. Lectures: 48

A] Course Objectives:

1. To Learn techniques for data cleaning, transformation, and handling missing values.
2. To Analyze Data, choose relevant Models and Algorithms for respective Applications.
3. To develop research interest towards advances in Data Mining.
4. To Understand the goals and applications of data mining in various domains
5. Explore supervised learning algorithms for classification and regression.

B] Course Outcome:

By the end of the course, students will be able to:

CO1. Demonstrate a clear understanding of the fundamental concepts and goals of data mining.

CO2. Articulate the significance of data mining in extracting valuable patterns and knowledge from large datasets.

CO3. Demonstrate proficiency in preprocessing data, including cleaning, transforming, and handling missing values.

CO4. Apply a range of data mining techniques, including clustering, classification, regression, and association rule mining.

CO5. Train and evaluate predictive models using appropriate metrics.

CO6. Apply data mining techniques to analyze time series data.

CO7. Apply data mining techniques to solve real-world problems in various industries.

Topic/Contents

Unit 1:	Introduction to Data Mining	(04L)
	1.1 What is Data Mining	
	1.2 What is not Data Mining	
	1.3 Challenges	
	1.4 Other Issues	
Unit 2:	Data	(06L)
	2.1 Types of Data	
	2.2 Data Quality	
	2.3 Data Pre-Processing	

Unit 3:	Classification	(10L)
	3.1 Problem Definition	
	3.2 General Approach	
	3.3 Decision Tree Induction	
	3.4 Rule Based Classifiers	
	3.5 Nearest Neighbour Classifiers	
	3.6 Bayesian Classifiers	
	3.7 Artificial Neural Networks	
	3.8 Support Vector Machine	
	3.9 Ensemble Methods	
	3.10 Model Evaluation	
Unit 4:	Association Analysis	(10L)
	4.1 Problem Definition	
	4.2 Frequent item set Generation	
	4.3 Rule Generation	
	4.4 Challenges	
	4.5 Interestingness Measures	
	4.6 Generalization of Association Patterns	
Unit 5:	Cluster Analysis	(10L)
	5.1 Introduction	
	5.2 Similarity and Distance	
	5.3 Density	
	5.4 Characteristics of Clustering Algorithms	
	5.5 Center based Clustering Techniques	
	5.6 Hierarchical Clustering	
	5.7 Density based Clustering	
	5.8 Other Clustering Techniques	
	5.9 Scalable Clustering Algorithms	
	5.10 Cluster Evaluation	
Unit 6:	Visualization	(08L)
	6.1 Introduction	
	6.2 General Concepts	
	6.3 Visualization Techniques	

Reference Books:

1. *Introduction to Data Mining* by Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, 2005, ISBN: 0321321367
2. *Data Mining: Concepts and Techniques* by Jiawei Han and Micheline Kamber, 2000, ISBN: 1558604898

Class: TYBBA (C.A) (Sem VI)
Course: Data Mining

Subject: BBA (C.A)
Course Code: BCA3604A

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	Programme Outcomes (POs)										
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11
CO 1	3										
CO 2										2	
CO 3	3				2						
CO 4			3								
CO 5			3	3							
CO 6		3									
CO7		3	3					3			3

PO1. Knowledge:

CO1 CO3 is strongly mapped as it involves foundational knowledge of data mining concepts, which is fundamental to the discipline.

PO2. Problem Analysis:

CO6 CO7 is moderately mapped as analyzing a problem and identifying computing requirements appropriate to its solution.

PO3. Design and Development:

CO4 CO5 CO7 is strongly mapped as it involves designing, training, and evaluating models, which is an experimental and analytical process. CO7 applies data mining techniques in a practical context to solve real-world problems, often requiring collaboration within a team.

PO4. Conduct investigations of complex problems:

CO5 is strongly mapped as students will be able to conduct the investigation of real-world data and design and develop models using regression classification.

PO5. Modern Tool Usage:

CO3 is moderately mapped as it involves the practical skills of preparing and cleaning data, which is essential for successful data mining.

PO8. Life-Long Learning:

CO7 is strongly mapped as it contributes to the development of students' ability to engage in life-long learning. Its goal is to produce graduates who can work with real-world data.

PO10. Communication:

CO2 is moderately mapped as it involves understanding the role and significance of data mining in addressing complex problems related to large datasets.

PO11. Innovation, employability, and Entrepreneurial skills:

CO7 strongly relates to employability skills as students can prepare real-world applications of data analytics, aligning with the program's focus on practical, industry-relevant skills.

SYLLABUS (CBCS) FOR T.Y.BBA (C.A.) (w. e. from June, 2021)

Academic Year 2021-2022

Class : T.Y.BBA (C.A.) (Semester - VI) Paper Code : BCA3604B

Title of Paper: Deep Learning

Credit: 3

No. of. Lectures: 48

A] Course Objectives:

1. Define and explain the basic concepts and principles of deep learning.
2. Understand the differences between traditional machine learning and deep learning.
3. Understand the fundamental building blocks of neural networks, including neurons, layers, and activation functions
4. Understand and apply appropriate evaluation metrics for different types of deep learning tasks.

B] Course Outcome:

By the end of the course, students will be able to:

- CO1. Demonstrate a clear understanding of the foundational principles and concepts of deep learning.
- CO2. Articulate the role of deep learning in the broader field of artificial intelligence.
- CO3. Demonstrate proficiency in training neural networks using backpropagation and gradient descent.
- CO4. Apply convolutional neural networks for tasks such as image classification and object detection.
- CO5. Apply deep learning techniques to natural language processing tasks.
- CO6. Understand the impact of hyper parameter choices on model training and generalization.
- CO7. Explore emerging technologies and their potential impact on deep learning research and applications.

Topic/Contents

Unit 1:	Introduction to Deep Learning	(08L)
	1.1 Why Deep Learning?	
	1.2 Deep Learning Models	
	1.2.1 Restricted Boltzmann Machines	
	1.2.2 Deep Belief Nets	
	1.2.3 Convolutional Networks	
	1.2.4 Recurrent Nets	
Unit 2:	The Neural Network	(12L)
	2.1 Building Intelligent Machines	
	2.2 The Limits of Traditional Computer Programs	
	2.3 The Mechanics of Machine Learning	
	2.4 The Neuron	
	2.5 Expressing Linear Perceptron as Neurons	
	2.6 Feed-forward Neural Networks	
	2.7 Linear Neurons and their Limitations	
	2.8 Sigmoid Tanh and ReLU Networks	
	2.9 Softmax Output Layers	

Unit 3: Training Feed-Forward Neural Networks (14L)

- 3.1 The Cafeteria Problem
- 3.2 Gradient Descent
- 3.3 The Delta Rule and Learning Rates
- 3.4 Gradient Descent with Sigmoidal Neurons
- 3.5 The Back Propagation Algorithm
- 3.6 Test Sets
- 3.7 Validation Sets
- 3.8 Over Fitting
- 3.9 Preventing Over Fitting in Deep Neural Networks

Unit 4: Convolution Neural Networks (14L)

- 4.1 Convolutional Neural Networks
- 4.2 Neurons in Human Vision
- 4.3 The Shortcomings of Feature Selection
- 4.4 Vanilla Deep Neural Networks
- 4.5 Filters and Feature Maps
- 4.6 Full Description of the Convolutional Layer
- 4.7 Max Pooling
- 4.8 Full Architectural Description of Convolution Networks
- 4.9 Closing the Loop on MNIST with Convolutional Networks, 4.10 Image Pre-processing Pipelines Enable More Robust Models

Reference Books:

1. Ethem Alpaydm, Introduction to Machine Learning, PHI, Third Edition,
2. Nikhil Buduma, Fundamentals of Deep Learning, O'Reilly, First Edition,
3. Shai Shalev-Shwartz and Shai Ben-David, Understanding Machine Learning (From Theory to Algorithms), Cambridge University Press, First Edition, ISBN No. 978-1-107-51282-5.
4. Christopher M. Bishop, Pattern Recognition and Machine Learning, Mcgraw-Hill, ISBN No. 0-07-115467-1.
5. Tom Mitchell, Machine Learning, Mcgraw-Hill, First Edition, ISBN No. 0-07-115467-1.
4. Ian Goodfellow and Yoshua Bengio, Deep Learning (Adaptive Computation and machine Learning Series), Massachusetts London, England, ISBN No. 978026203561

Class: TYBBA (C.A) (Sem VI)
Course: Deep Learning

Subject: BBA (C.A)
Course Code: BCA3604B

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation.

Course Outcomes	Programme Outcomes (POs)										
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11
CO 1	3										
CO 2	3										
CO 3	3										
CO 4		2		3							
CO 5				3							
CO 6	3										
CO7								2			2

PO1. Knowledge:

CO1 CO2 CO3 CO6 strongly mapped as students will able to define and explain key concepts in deep learning, such as neural networks, activation functions, and backpropagation.

PO2. Problem Analysis:

CO4 Moderately mapped as the Students will able to understand complex concepts and optimize models, fostering critical thinking and problem-solving skills.

PO4. Conduct investigations of complex problems:

CO4 CO5 strongly mapped as student will be able to Develop and implement neural networks using popular deep learning frameworks.

PO8. Life-Long Learning:

CO7 strongly mapped as students will able to transferable skills like working with different frameworks and adapting to new technologies

PO11. Innovation, employability, and Entrepreneurial skills:

CO7 moderately relate to employability skills as students are able to apply emerging technologies and their potential impact on deep learning research and applications.

SYLLABUS (CBCS) FOR T.Y.BBA (C.A.) (w. e. from June, 2021)

Academic Year 2021-2022

Class : T.Y.BBA (C.A.) (Semester - VI) Paper Code : BCA3605

Title of Paper: Project

Credit: 3

No. of. Lectures: 48

A] Course Objectives:

1. To introduced project planning.
2. To examine the stages of project planning: Scoping, Eutxstimation, analysis and Designing.
3. To focus on the tools available to a project planner.
4. To discuss project planning and the planning process.
5. To meet all project goals successfully.

B] Learning Outcomes:

By the end of the course, students will be able to:

CO1.Learn project management.

CO2.Become systems thinkers.

CO3.Become explorers.

CO4.Become problem-solvers.

CO5.More engaged in the learning process.

CO6.Learn to take creative risks.

CO7.Students are provided to work on multidisciplinary Problems.

CO8.Students should be able to design and construct a hardware and software system, component, or process to meet desired needs.

Evaluation:

External Evaluation	Marks
Project Report	30
Power Point Presentation	10
Viva	20
Project Logic	20
Project Demonstrations	20
Total	100

Class: TYBBA (C.A) (Sem V)
Course: Project

Subject: BBA (C.A)
Course Code: BCA3605

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	Programme Outcomes (POs)										
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11
CO 1	3		2						3		
CO 2		3	2						3		
CO 3		3	2						3		
CO 4		3	2						3		
CO 5			2		2			3	3		
CO 6			2						3		
CO7			2	3			2		3		
CO8			2		3				3		3

PO1. Knowledge:

CO1 Strongly mapped as the student will develop the deep understanding of flow of System to be designed and developed.

PO2. Problem Analysis:

CO2 CO3 CO4 Contribute to the development of students' problem analysis, thinking skills and problem-solving skills. it is Moderately mapped as the Students will apply their knowledge to understand they system and project development

PO3. Design and Development:

CO1 CO2, CO3 CO4CO5 CO6 CO7 CO8 moderately mapped as the students will be able to design develop, test and work on multidisciplinary Problems in project development

PO4. Conduct investigations of complex problems:

CO7 strongly mapped as student will be able to conduct the investigation and of real word data and design and develop user interfaces for real world scenario.

PO5. Modern Tool Usage:

CO 8 strongly mapped student will develop different applications Using modern computing tool and frameworks.CO5 moderately mapped as student will engage themselves in learning of project management

PO8. Life-Long Learning:

CO5 strongly mapped as student will engage themselves in learning of project management as it contributes to the development of students' ability to engage in life-long learning as real life data management

PO9. Project Management:

CO1 CO2, CO3 CO4CO5 CO6 CO7 CO8 strongly mapped as student can create software's and learn the complete lifecycle of project management

PO11. Innovation, employability, and Entrepreneurial skills:

CO8 strongly relate to employability skills as students should be able to design and construct a hardware and software system, component, or process to meet desired needs.

SYLLABUS (CBCS) FOR T.Y.BBA (C.A.) (w. e. from June, 2021)

Academic Year 2021-2022

Class : T.Y.BBA (C.A.) (Semester - VI) Paper Code : BCA3606

Title of Paper: Computer Laboratory based on (3601)

Credit: 2

No. of. Lectures: 48

Course Objective:

1. Explain data science and its applications.
2. Understand the strategies of data collection and pre-processing.
3. Apply statistics methods to develop models.
4. Learn the evaluation metrics and techniques.

Course Outcomes:

By the end of the course, students will be able to:

CO1.Build enterprise level mobile applications with Java on Android.

CO2.Understand both the basic and advanced concepts of Java.

CO3.Understanding and implementing the lifecycle methods of an Android activity.

CO4.Install and configure Android Studio.

CO5.Explain and use key Android programming concepts.

CO6.Using intents for inter-component communication.

CO7.Deploy the application on SQLite Database, Activity, Views, and View Groups.

Topics/Content

1) Write a Python Code to Create a Dictionary & perform the following operation-

- a)Updating Dictionary Element
- b>Delete Dictionary Element
- c)Check Presence of key in Dictionary or Not
- d)Print all keys & Values

2)Write a Python Code to accept the number of student data in a dictionary like Name of Student,

Roll Number, Marks and perform following operations

- a)Display all student information
- b)By Entering Mark find the Name of Student

3)Write a Python code to create a Simple array of one dimension to perform following array operations-

- a)Display all individual element in array
- b)Make Sum of all Elements in Array

4) Write a Python code to create Two Simple one dimensional array and make addition of both array elements into third array.

5) Write a Python code to find Minimum and Maximum value in an Array.

6) Write a Python Code to create a Series by-

- i) From Array
- ii) From Dictionary
- iii) From Scalar

7) Write a Python Code to create a DataFrame and perform the following column operations (Use Following DataSet)

	name	age	city	Maths	science
0	sachin	18	pune	85	87
1	kartik	22	solapur	87	90
2	piyush	21	kolhapur	88	91
3	Mahesh	20	Banglore	85	90

- i) Column Selection in DataFrame
- ii) Addition of Two Column Values
- iii) Deletion of Column

8) Write a Python code to Create DataFrame to perform following Row Operations (Use Following DataSet)

	name	age	city	Maths	science
0	sachin	18	pune	85	87
1	kartik	22	solapur	87	90
2	piyush	21	kolhapur	88	91
3	Mahesh	20	Banglore	85	90

	name	age	city	Maths	science
n	Smith	18	pune	85	92

- i) Selection of row
- ii) Insertion of new row
- iii) Deletion of any row

9) Write a python code to perform various indexing operation (Use Following DataSet)

i) Label Based Indexing (.loc)

	name	age	city	Maths	science
a	sachin	18	pune	85	87
b	kartik	22	solapur	87	90
c	piyush	21	kolhapur	88	91
d	Mahesh	20	Banglore	85	90

ii) Integer Based Indexing (.iloc)

	name	age	city	Maths	science
0	sachin	18	pune	85	87
1	kartik	22	solapur	87	90
2	piyush	21	kolhapur	88	91
3	Mahesh	20	Banglore	85	90

10) Write a Python Code to perform Following Boolean Indexing Operations (Use Following DataSet)

	name	age	degree	Score
True	Aparna	18	BCA	85
False	Pankaj	22	MBA	87
True	piyush	21	BBA	88
False	Geeta	20	BTECH	85

- i) Accessing Dataframe by .loc()
- ii) Apply Boolean Mask to Dataframe

11) Create an Array in the range 1 to 20 with values 1.25 apart. Another array contains the log values

of the elements in first array.

- a) Simply plot the two arrays first vs second in a line chart
- b) Change the x-axis label as “Random Values” & Y-axis as “Logarithmic values”
- c) create a third array that shows the cos values of first array and plot that with first array. The Cos line should be plotted with a dash dotted line.

12) T.C. College celebrated volunteering week where each section of class TY dedicated a day for collecting amount for charity being supported by the college. Section A volunteered on Monday, B on Tuesday, C on Wednesday and so on. There are six sections in class TY. Amount collected by sections A to F are 8000, 12000, 9800, 11200, 15500, 7300.

- A) create a bar chart showing collection of amount.
- B) Plot the collected amount vs days using a bar chart.
- C) Plot the collected amount vs Sections using bar chart.

13) Write to create a pie for sequence con=[23.4,17.8,25,34,40] for zones=['East','West','North','South','Central'].

- A) Show North Zone's Value Exploded
- B) Show % Contribution for each zone
- C) The Pie Chart should be Circular

14) Create a multiline line charts on common plot where three data ranges are plotted on same chart. The data ranges to be plotted is –

Data=[[5.0, 25.0, 45.0, 20.0],[8.0,13.0,29.0,27.0],[9.0,29.0,27.0,39.0]]

15) Create a Scatter Plot Chart having two array as follows.

[5,7,8,7,2,17,2,9,4,11,12,9,6]

[99,86,87,88,111,86,103,87,94,78,77,85,86]

- a) Show simple scatter plot.
- b) Set your own color of the Markers.

16) Write a Python code to perform the following operations use following [dataset](#)

- i) Check empty or missing data in all dataset
- ii) Check empty or missing data in column 'Postcode'
- iii) Display total count of missing data in each column
- iv) Drop rows that are having missing values

17) Write a Python code to perform the following operations use following [dataset](#)

- i) Display unique value in column 'Price'
- ii) Display total number (Count) unique value
- iii) Display duplicate rows in dataset
- iv) Display total count of all duplicates

18) Write a Python code to perform the following operations use following [dataset](#)

- i) Find the total marks of column Maths
- ii) Find the Mean & standard deviation of marks in column Science
- iii) Find minimum marks in Physics & Maximum marks in Maths
- iv) Find minimum marks all Subjects

19) Write a Python code to perform the following operations use following [dataset](#)

- i) Use groupby function to create a group of "Course"

- ii) Display first row Group “Course”
- iii) Display all rows in a Group “Course”
- iv) Create a group “Maths” & display its mean

Index	User ID	Gender	Age	EstimatedSalary	Purchased
0	15624510	Male	19	19000	0
1	15810944	Male	35	20000	0
2	15668575	Female	26	43000	0
3	15603246	Female	27	57000	0
4	15804002	Male	19	76000	0
5	15728773	Male	27	58000	0
6	15598044	Female	27	84000	0
7	15694829	Female	32	150000	1
8	15600575	Male	25	33000	0
9	15727311	Female	35	65000	0
10	15570769	Female	26	80000	0
11	15606274	Female	26	52000	0
12	15746139	Male	20	86000	0
13	15704987	Male	32	18000	0
14	15628972	Male	18	82000	0
15	15697686	Male	29	80000	0

20) Write a Sklearn Library code to create a simple Linear Regression Algorithm that creates random number in the range (0,10000) and test the data [10,20,30] against the expression $=a+(2*b)+(3*c)$.

Class: TYBBA (C.A) (Sem VI)
Course: Computer Laboratory based on (3601)

Subject: BBA (C.A)
Course Code: BCA3606

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Course Outcomes	Programme Outcomes (POs)										
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CO 1	2		3								
CO 2	3										
CO 3	3										
CO 4	2	2	3		2						
CO 5		2		2	2			3			
CO 6			3								
CO7					2			3	2		3

PO1. Knowledge:

CO2 CO3 strongly mapped as students will get disciplinary knowledge, Proficiency in Python is a fundamental skill for data analysts. It provides a strong foundation in programming.
 CO1 CO4 moderately mapped as student apply their knowledge to build applications

PO2. Problem Analysis:

CO4 CO5 Moderately mapped as the Students will able to Apply various python library for solving real life problems.

PO3. Design and Development:

CO1 CO4 CO6 Strongly mapped as the students will be able to Develop effective data visualization skills to Build Machine Learning Models.

PO4. Conduct investigations of complex problems:

CO5 moderately mapped as student will be able to conduct the investigation of real word data and design and develop models using regression classification

PO5. Modern Tool Usage:

CO2 CO5 CO7 moderately mapped student will create different models of ML using algorithms as Modern tool

PO8. Life-Long Learning:

CO5 CO7 strongly mapped as it contributes to the development of students' ability to engage in life-long learning as students can build models based on real-world data.

PO9. Project Management:

CO7 moderately mapped as student can create models with real word data using different Models of ML

PO10. Communication:

CO2 moderately mapped as it aligns with the program's focus on developing both analytical and communication skills in term of ML

PO11. Innovation, employability, and Entrepreneurial skills:

CO7 strongly relate to employability skills as students are able to prepare real-world applications of data analytics, aligning with the program's focus on practical, industry-relevant skills.

SYLLABUS (CBCS) FOR T.Y.BBA (C.A.) (w. e. from June, 2021)

Academic Year 2021-2022

Class : T.Y.BBA (C.A.) (Semester - VI) Paper Code : BCA3607

Title of Paper: Computer Laboratory based on (3602)

Credit: 2

No. of. Lectures: 48

A) Course Objectives:

- 1) To understand what is a MongoDB database
- 2) Learn to work with data stored in BSON or JSON format.
- 3) Learn to create and manipulate documents in MongoDB.
- 4) Master the use of Create, Read, Update and Delete (CURD) operations.
- 5) Learn to create an Aggregation Pipeline
- 6) To learn MongoDB configuration and backup method, monitoring, and operational strategies.
- 7) To learn how to handle data storage, data modeling, ingestion, query, sharding, and data replication with MongoDB, along with installing, updating, and maintaining the MongoDB environment.

B) Course Outcome:

By the end of the course, students will be able to:

- CO1.** Define and explain the fundamental concepts of NoSQL databases, including their development and key characteristics.
- CO2.** Perform Create, Read, Update, and Delete (CRUD) operations on NoSQL databases, demonstrating proficiency in handling data.
- CO3.** Analyze and implement strategies for horizontal scalability and optimize performance in a NoSQL database environment.
- CO4.** Analyze and apply NoSQL databases to real-world use cases, identifying scenarios where NoSQL is more suitable than traditional relational databases.
- CO5.** Demonstrate competency in designing NoSQL database management systems.
- CO6.** Apply NoSQL development tools on different types of NoSQL Databases.
- CO7.** Compare and contrast RDBMS with different NoSQL databases.
- CO8.** Evaluate NoSQL database development tools and programming languages.

Topic / Contents

Q.1. MongoDB:

A) Create a 'films' collection of documents with the following fields:

```
{  
title : "Jurassic Park", director : "Steven Spielberg",  
release_year : 1993, language:"English",  
film_type : [ "Action", "Adventure "],  
actors : ["Sam Neill", "Laura Dern", "Jeff Goldblum"]  
}
```

- 1) Insert at least 10 documents in a collection.
- 2) Display all documents of 'films' collection in proper format.

B) Solve the Following Queries:

- 1) Give all English films released before year 2000.
- 2) Display title and release year of 'Action' films that starts with the letter 'K'.
- 3) Display the latest five 'Hindi' films released in easy-to-read format.
- 4) Count the number of films in which 'Akshay Kumar' has not acted.
- 5) Update release year of a film 'Jungle Book' to 2016.

Q.2. MongoDB:

A) Create a 'Competition' collection of documents with the following fields:

```
{Competition_Name: "...", Competition_Type: "...", Competition_Year:...,students:["...",  
"...", "..."] }
```

In this, Competition_type can be 'Sport' or 'Academic'.

- 1) Insert at least 10 documents in a collection.
- 2) Display all documents of 'Competition' collection in proper format.

B) Solve the Following Queries:

- 1) Display all 'Sport' competition details which were held between years 2018 to 2019.
- 2) Display number of students participated in 'Running' competition which was conducted in year 2019.

- 3) Update Competition_name of 'Programming Competition' to 'Online Programming Competition' for year 2020.
- 4) Add one more name of student 'Prasad More' in 'Project Competition' of year 2021.
- 5) Sort Competition collection in descending order of Competition_Year.

Q.3. MongoDB:

A) Create a 'Hospital' collection of documents with the following fields:

B) { hospital_name:"Birla Hospital",
city: "Chinchwad",

```
specialties:["Pediatric", "Orthopedic"],  
doctors:[{doctor_name:"Dr. Kadam", visit_day:"Monday"}, {doctor_name:"Dr.Mane",  
visit_day:"Tuesday"}],  
services:["laboratory", "surgical", "diagnostic", "ambulance"],rating:5  
}
```

- 1) Insert at least 10 documents in a collection.
 - 2) Display all documents of 'Hospital' collection in proper format.
-
- 1) Solve the Following Queries:
 - 2) Display details of hospital where Dr. More is visiting.
 - 3) Display all hospital names along with their specialties from 'Pune' city.
 - 4) Count the number of hospitals which are providing 'ambulance' service.
 - 5) Display details of hospital whose 'rating' is specified.
 - 6) Delete those documents whose hospital name starts with letter 'P'.

Q.4. MongoDB:

A) Create a 'Book' collection of documents with the following fields:

```
{  
Book_Title:"....", Publisher_name:"....", Authors:[".....","....."],  
Language:"....",Publication_year:.....,ISBN:....., price:.....  
}
```

- 1) Insert at least 10 documents in a collection, use bulk insert.
- 2) Display all documents of 'Book' collection in proper format.

B) Solve the Following Queries:

- 1) Display two books of 'BPB' publication.
- 2) Display Book_title and Authors of books published between years 2019 to 2021.
- 3) Count number of books having three authors.
- 4) Update the ISBN number of book titled "Definitive Guide to MongoDB" to "1-4302-3051-7".
- 5) Add one more author "Alex Buckley" to book titled "The Java Languages Specification".

Q.5. MongoDB:

A) Create an 'Institute' collection of documents with the following fields:

```
{ Name:"....", City:"....",No_of_faculties:.....,Est_Year:....., Courses:[{Course_Name:"....",  
Dur_in_month:.....,Fees:.....},...]  
}
```

- 1) Insert at least 10 documents in a collection.
 - 2) Display all documents of 'Institute' collection in proper format.
- 1) Solve the Following Queries:
- 2) Give all institute names whose establishment year is before 2010.
 - 3) Display Institute details having Course 'Java'.
 - 4) Update No_of_faculties of 'Disha' Institute to 10.
 - 5) Display the latest three Institutes established in easy-to-read format.
 - 6) Count the number of Institutes in 'Pune' city, established after 2019.

Q.6. MongoDB:

A) Create a 'Doctor' collection of documents with the following fields:

```
{
  Doctor_name:"Dr. Patil",
  Contact_No:9876543210,City: "Pune",
  Qualification:"MBBS",
  specialization:["ENT", "General Surgery"], hospitals:[{hospital_name:"Niramay
  Hospital", visit_day:"Monday"},
  {hospital_name:"Birla Hospital", visit_day:"Tuesday"}]
}
```

- 1) Insert at least 10 documents in a collection, use bulk insert.
- 2) Display all documents of 'Doctor' collection in proper format.

B) Solve the Following Queries:

- 1) Count number of doctors having qualification 'MBBS'.
- 2) Display qualification and specialization of all doctors from 'Mumbai' city.
- 3) Display details of two doctors having specialization in 'ENT'.
- 4) Change qualification of "Dr. Patil" to MD.
- 5) Delete all Doctor Documents not having city 'Pimpri'.

Q.7. MongoDB:

A. Create a 'Result' collection of documents with the following fields:

```
{
  student_id:1, student_name:"Mr. Anuj Joshi",
  class:"TYBBA_CA",
  test_marks:[{subject:"Java",marks:78},{subject:"Python",marks:80}], grade: 'A'
}
```

A) Insert at least 10 documents in a collection.

B) Display all documents of 'Result' collection in proper format.

B) Solve the Following Queries:

- 1) Display details of students whose 'grade' is given.
- 2) Display documents where the subject is 'Java' and marks are greater than or equal to 70.

- 3) Display student details whose name ends with “ne”.
- 4) Give name and class of student who has given 4 subject tests.
- 5) Insert a field percentage in student document whose name is “Ms. Priya Rane”

Q.8. MongoDB:

A) Create an ‘Album’ collection of documents with the following fields:

```
{title:"....",artist: ["....","...."],released_year: .....,
tracks:[{track_id: ....., track_title:"....",seconds: .... },.....],genre: "...."}
```

- 1) Insert at least 10 documents in a collection, use bulk insert.
- 2) Display all documents of ‘Album’ collection in proper format.

B) Solve the Following Queries:

- 1) Count number of albums released between years 2010 to 2020.
- 2) Display two documents which have genre ‘Rock’.
- 3) Give title and artist of an album which has 3 tracks.
- 4) Display albums that do not have genre either ‘Rock’ or ‘hip-hop’.
- 5) Update the seconds of the track to 6.38 whose track id is 2 and album title is “What’s Going On”.

Q.9. MongoDB:

A) Create a ‘Contributor’ collection of documents with the following fields:

```
{ Contributor_name: "Rohit Sawant",
Branch:"CSE",
Join_year:2019, Language:["C++", "Java"],
Articles:[{Language:"C++",tArticles:20,pArticles:30},{Language:"Java",tArticles:50,pArticles:30}],
Personal_Info: {age:24, Sem_Marks:[70, 80, 77, 81]}
}
```

- 1) Insert at least 10 documents in a collection.
- 2) Display all documents of ‘Contributor’ collection in proper format.

B) Solve the Following Queries:

- 1) Append two languages named “Python” and “C” to contributor “Rohit Sawant”.

- 2) Delete the first matched document having Branch “CSE” or Join_Year less than 2020.
- 3) Display the latest five Contributors joined in easy-to-read format.
- 4) Display documents having “CSE” branch. (Use cursor)
- 5) Give the name and branch of contributor whose age is greater than or equal to 20.

Q.10. MongoDB:

A) Create a ‘Person’ collection of documents with the following fields:

```
{pname: "....", contact_no: .... , city: "....", profession: ["....","...."],
cars:[{model: "....", year: .....,price: .... }, .... ]}
```

- 1) Insert at least 10 documents in a collection, use bulk insert.
- 2) Display all documents of ‘Person’ collection in proper format.

B) Solve the Following Queries:

- 1) Display the name and contact number of person having 3 cars.
- 2) Display different cities from which persons belong.
- 3) Create an index using the ‘pname’ field and name it as ‘Person Name Index’.
- 4) Delete the first person document whose city is ‘Chinchwad’.
- 5) Update Person document whose name is “Mrs. Mahajan” while updating add only those professions which are not already exists in her profession field.

Q.11. MongoDB:

A) Create a ‘Company’ collection of documents with the following fields:

```
{
    company_id:1,
    company_name:"Apple",
    contact_details:{ address: "Cupertino, CA 95014", phone: "1-408-996-1010"},products:[{code:
"A-123", name:"iPhone 7", price: 29,900},{code: "A-456", name: "IPadPro", price: 37,900}],
    rating:5
}
```

- 1) Insert at least 10 documents in a collection.
- 2) Display all documents of ‘Company’ collection in proper format.

B) Solve the Following Queries:

- 1) Count number of mobile companies whose name ends with letter 'o'.
- 2) Sort the company collection in descending order of their id.
- 3) Give address and phone number of 'Samsung' company.
- 4) Update the price of the 'iPhone 7' to 32,900.
- 5) Display details of company whose 'rating' is specified.

Q.12. MongoDB:

A) Create a 'Customer' collection of documents with the following fields:

```
{
  Cust_id: 1,
  Cust_name: "Mr. Joshi",
  address: {city: "Pune", street: "S. B. Road"}, orders: [
    {
      id: 101,
      orderItems: [
        {
          productId: 8, price: 560,
          productName: "keyboard"
        },
        ...
      ],
      ...
    }
  ]
}
```

- 1) Insert at least 10 documents in a collection.
- 2) Display all documents of 'Customer' collection in proper format.

B) Solve the Following Queries:

- 1) Display customer details that have placed two orders.
- 2) Replace the document having id 3 with a new document.
- 3) Increment the price of 'keyboard' by Rs. 100.
- 4) Add one more product in an order having order id 101, which is placed by "Mr. Joshi".
- 5) Display all the documents having customer id greater than or equal to 4.

Q.13. MongoDB:

A) Create a 'Company' collection of documents with the following fields:

```
{
  company_id: 1,
  company_name: "Apple",
  contact_details: { address: "Cupertino, CA 95014", phone: "1-408-996-1010" }, products: [
    {code: "A-123", name: "iPhone 7", price: 29,900},
    {code: "A-456", name: "IPadPro", price: 37,900}
  ],
}
```

rating:5

}

- 1) Insert at least 10 documents in a collection.
- 2) Display all documents of 'Company' collection in proper format.

B) Solve the Following Queries:

- 1) Count number of mobile companies whose name ends with letter 'o'.
- 2) Sort the company collection in descending order of their id.
- 3) Give address and phone number of 'Samsung' company.
- 4) Update the price of the 'iPhone 7' to 32,900.
- 5) Display details of company whose 'rating' is specified.

Q.14. MongoDB:

A) Create a 'Customer' collection of documents with the following fields:

```
{
  Cust_id: 1,
  Cust_name: "Mr. Joshi",
  address: {city: "Pune", street: "S. B. Road"}, orders: [
    {
      id: 101,
      orderItems: [
        {
          productId: 8, price: 560,
          productName: "keyboard"
        },
        ...
      ],
      ...
    },
    ...
  ]
}
```

- 1) Insert at least 10 documents in a collection.
- 2) Display all documents of 'Customer' collection in proper format.

B) Solve the Following Queries:

- 1) Display customer details that have placed two orders.
- 2) Replace the document having id 3 with a new document.
- 3) Increment the price of 'keyboard' by Rs. 100.
- 4) Add one more product in an order having order id 101, which is placed by "Mr. Joshi".
- 5) Display all the documents having customer id greater than or equal to 4.

Q.15. MongoDB:

A) Create a 'Projects' collection of documents with the following fields:

```
{
    proj_id: .....,
    proj_name: "....", proj_manager: "....",
    start_date: ....., dur_in_month: .....,
    emps_work_in_proj: ["....", "...."]
}
```

- 1) Insert at least 10 documents in a collection.
- 2) Display all documents of 'Projects' collection in proper format.

B) Solve the Following Queries:

- 1) Display id and name of all those projects having duration greater than or equal to six months.
- 2) Count number of projects managed by "Mr. Sumit Jadhav".
- 3) Increment the duration of all projects by one month.
- 4) Add one more employee "Mr. Mahesh Kulkarni" to the "College Automation" project.
- 5) Display details of projects in which 4 employees are working.

A) Write a java program to calculate sum of digits of a given number using recursion.

B) Write a java program to accept n employee names from user. Sort them in ascending order and Display them.(Use array of object and Static keyword)

Q.16. MongoDB:

A) Create two documents named user1 and user2 as follows:

- 1) user1 = {FName: "Test", LName: "User", Age:30, Gender: "M", Country: "India"}
user2 = {Name: "Test User", Age:45, Gender: "F", Country: "India"}

add both these documents (user1 and user2) to the users collection in the subsequent order.

- 2) Verify your created collection and database by using proper Mongo DB command

B) Solve the Following Queries:

- 1) Display all documents in the users collection.
- 2) Updates the country to UK for all female users and check whether the country has been updated for all the female employees or not.

- 3) Add new field company to all the documents.
- 4) Delete the documents where Gender = 'M' .
- 5) Add 5 more similar documents in a collection and find all female users who belong to either India or US.

Q.17. MongoDB:

A) Solve the following:

- 1) Create document named scientist with following fields:

{First Name: _____, Last Name: _____, Contribution: _____, Awarded: _____, date_of_birth: _____, Year : _____, Country: _____ } in a collection.

The document keeps information about the scientist who has contributed in various fields like Artificial intelligence, Data Science etc. The scientist may have contributed in more than one field and may have received more than one awards for his contribution in various fields.

- 2) Insert at least 10 documents in a collection.

B) Solve the Following Queries:

- 1) List names of all scientists whose last name starts with N.
- 2) List all scientists who were born after 1/1/1960.
- 3) List scientists that received an award in year 2000.
- 4) List all scientists who have received "Turing Machine Award"
- 5) List all scientist who has made contributed in 4 fields

Q.18. MongoDB:

A) Solve the following :

- 1) Create documents Inventory with following fields:

{Item Name: _____, status: _____, Tags: _____, qty: _____ }

- 2) Insert at least 10 documents in a collection with suitable values. Verify created documents.

B) Solve the Following Queries:

- 1) List all items from the inventory where the status equals "D" and qty is greater than 30.
- 2) List all items which have 3 tags.

- 3) List all items having status equal to “A” or having quantity less than 30 and height of the product should be greater than 10
- 4) Delete the documents where status = ‘C’
- 5) Find all documents that keep item “Planner” and having in stock quantity less than 20

Q.19. MongoDB:

A) Solve the following:

- 1) Create documents containing transaction information as:

```
{Transaction_id:           Customer Name:      , Payment_mode: , Amount:
                               Date: }
```

in which the payment was done – Cash, Credit Card or Debit Card in a collection. Verify your created collection and documents by using proper command.

- 2) Insert at least 10 documents in a collection.

B) Solve the Following Queries:

- 1) Find all transactions which were made by the user “Vikas”.
- 2) Find all the transactions which were made using debit card.
- 3) Find transaction id and total amount of purchase made using a credit card.
- 4) Find the total payment for each payment type.
- 5) List all transactions made by customers on particular date.

Q.20. MongoDB:

A) Solve the following:

- 1) Create collection called “marketing” which stores data about a marketing campaign of a retail business. A document in this collection includes the following pieces of information.

```
{_id :           , Age :      , Gender :           , OwnHome :           , Married :
, Location :           , Salary :           , Children :           , History :
"High/Low", Catalogs :           , AmountSpent :           }
```

Verify your created collection and document by using proper command.

- 2) Insert at least 10 documents in a collection and verify inserted document.

B) Solve the Following Queries:

- 1) Display first 3 documents in the collection.
- 2) Find out the average spent amount by customers who received more than 10 catalogs.
- 3) Find average spent amount by customers who received more than 10 catalogs for different age groups separately.
- 4) Calculate the average salary and the total spent amount for customers who have at least 1 child.
- 5) Display the salary and spent amount fields of the first 5 documents.

Q.21. MongoDB:

A) Solve the following:

- 1) Create two documents named emp1 and emp2 as follows:

emp1 = {Empid: _____, EmpName: _____, Department: _____, Salary: _____ }

emp2 = {Empid: _____, Age: _____, Address: _____ }

add both these documents (emp1 and emp2) to the Employee collection in the subsequent order.

- 2) Verify your created collection and database by using proper command.

B) Solve the Following Queries:

- 1) Display all documents in the Employee collection.
- 2) Updates the department to Marketing for all employees having salary greater than 20000 and less than 30000.
- 3) Add new field company to all the documents.
- 4) Delete the documents where Age > 60 .
- 5) Add 5 more similar documents in a collection and find all employees who lives in Pune and age less than 25.

Q.22. MongoDB:

A) Solve the following:

- 1) Create documents for Online Mobile Shopping information in a collection as follows:

{CustomerName: _____ Model: _____, Brand: _____, Price: _____, RAM_Size: _____, Internal_Memory: _____ Ratings_by_customer: _____ } Verify

your created collection and documents by using proper command.

- 2) Insert at least 10 documents in a collection.

B) Solve the Following Queries:

- 1) List the mobiles having RAM and ROM as 3GB and 32GB.
- 2) List the customers who bought Samsung J6.
- 3) List the names of the distinct brands purchased by customer.
- 4) Display the name of the brand with highest rating.
- 5) List all the customers in ascending order who bought iphone 7 plus

Q.23. MongoDB:

A) Solve the following:

- 1) Create document to grocery store as follows:

{item_id: , Batch_no: , Item_name: , Price: , Weight:
, Category: , items_in stock: }in
“departmental_store” collection.

- 2) Insert at least 10 documents in a collection with suitable values. Verify created documents.

B) Solve the Following Queries:

- 1) Display all documents in the “departmental_store” collection with batch no B1001.
- 2) Updates the Price of items for items having batch B1002
- 3) Display all items that comes in grain category.
- 4) Delete the items which stock is 0
- 5) Sort all items by their Batch_nos.

Q.24. MongoDB:

A) Solve the following:

- 1) Create a database named ‘College’. Create collection named ‘Commerce’ in it. This collection should contain a document. Inside this document, we have a field named ‘Teacher_id’, ‘Teacher_Name’, ‘Address’, ‘Salary’. Each document contains another

document with three fields(Specialization, Qualification, Experience) with their one or more values.

Verify your created collection and database by using proper command.

2) Insert at least 10 documents in a collection with suitable values.

B) Solve the Following Queries:

1) Display all documents in created collection.

2) Display all teachers having more than 10 years of experience.

3) Add new field College_Name to all documents.

4) List all teachers having specialization in 'Accounting' subject.

5) Increment salary of all teachers having experience more than 10 years by Rs.5000.

Q.25. MongoDB:

A) Solve the following:

1) Created database TV Network containing a collection of products with multiple documents having fields {"product_id" : , "product_name" : , "company" : , "type" :

,"price" : , "warranty_years" : , "available" : "true"} ,

2) Insert at least 10 documents in a collection with suitable values. Verify your created collection and database by using proper command.

B) Solve the Following Queries:

1) Check if the cursor object has more documents to return or not.

2) Return the next document in a cursor.

3) Insert a new document having, product_name = "Tata sky", "type" : "tv",
"monthly_price" : 250, "term_years" : 2, "cancel_penalty" : 25, "sales_tax" : "true",
"additional_tariffs" : [{ "kind" : "federal tariff", "amount" : { "percent_of_service"

: 0.06 } } , { "kind" : "misc. tariff", "amount" : 2.25 }]

4) sort all the documents present in the products collection in descending order.

5) Find how many documents are present in a collection.

Q.26. MongoDB:

A) Solve the following:

1) Create Programmer collection with documents containing fields

```
{Programmer_name:           ,Join_year:           , Languages:[.....,.....,
.....], Programmer_details: {age:           , "Address":[.....,..... ]}};
```

2) Insert at least 10 documents in a collection with suitable values. Verify your created collection and database by using proper command.

B) Solve the Following Queries:

- 1) Append a single value, i.e., “C” to an array field, i.e., Language field in the document whose Programmer_name is “Neha”.
- 2) Remove the **first** element of the Language field in the document whose programmer_name is “Rahul”.
- 3) Removing the **last** element of the Language field in the document whose Programmer_name is “Rahul”.
- 4) Adds “PHP” in the Language field for the programmer Radha.
- 5) Delete the first document containing programmer name ‘Radha’.

Q.27. MongoDB:

A) Solve the following:

1) Create documents with following data in a collection:

```
{_id:           ,vidio_title:           ,description:           , YouTuber Name:,           url:,
tags: ['mongodb', 'database', 'NoSQL'], likes: 100 }
```

2) Insert at least 7 documents in a collection with suitable values. Verify your created collection and database by using proper command.

B) Solve the Following Queries:

- 1) Display a list stating how many videos are uploaded by each youtuber.
- 2) Gets the maximum likes of the corresponding values from all documents in the collection for each youtuber.
- 3) Calculates the average likes of all given values from all documents in the collection for each youtuber.
- 4) Find total likes received to each youtuber.
- 5) Calculate total likes received to youtuber except “Mongo DB” video.

Q.28. MongoDB:

A) Solve the following:

- 1) Create a collection to embed the 3 branch document inside the Bank document like ("Bank_name": , "Contact": , "Address": , "branch": , "city":)

that maintains all the related data in a single document. Branch should contain fields like branch_id, branch_name & branch_address.

- 2) Insert at least 8 documents in a collection with suitable values. Verify your created collection and database by using proper command.

B) Solve the Following Queries:

- 1) Display all branches in individual city.
- 2) Updates the Address of branch in city Pune.
- 3) Add new branch in a city Baramati.
- 4) Delete the one branch in city Pune.
- 5) Count total branches in individual city.

Q.29. MongoDB:

A) Solve the following:

- 1) Create a collection "**Customer**" which contains documents with the same structure like this one:

```
{ "_id" : , "firstname" : , "lastname" : , "email" :  
  "password" : , "last_login" : , "address" : { "country":  
  , "street" : , "zip" : , }
```

- 2) Insert at least 8 documents in a collection with suitable values. Verify your created collection and database by using proper command.

B) Solve the Following Queries:

- 1) Replace a single existing document entirely with other data.
- 2) Replace the document for current firstname field that you have taken in your document.
- 3) Insert some other similar documents in it.
- 4) Find the first document which firstname field is equal "Rahul" and updates (sets) the lastname field to "Patil".
- 5) Update multiple fields of a document.

Q.30. MongoDB:

A) Solve the following:

1) Create a collection **employee** in your database with the following type of documents:

```
{"_id": 1,"emp_name": { name:, surname:          }, "age":,"city":,"salary": }
```

2) Insert at least 8 documents in a collection with suitable values. Verify your created collection and database by using proper command.

B) Solve the Following Queries:

1) Define a single field index on the **age** field and also drop created index.

2) Define a multiple field index on the age field for descending and city field for ascending order.

3) Write mongo DB queries that will use the index both for retrieving the documents and for sorting.

4) Retrieve all the indexes in the collection.

5) Find total salary spend on employee.

Class: TYBBA (C.A) (Sem VI)
Course: Computer Laboratory based on (3602)

Subject: BBA (C.A)
Course Code: BCA3607

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

Course Outcomes	Programme Outcomes (POs)										
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11
CO 1	3										
CO 2			3								
CO 3		2	3		3			3			
CO 4			3								
CO 5	2								3		
CO 6		3	3					3			3
CO7	3										

PO1. Knowledge:

CO1 CO7 strongly mapped as it contributes to the development of students' disciplinary knowledge concepts of NoSQL databases, Co5 moderately mapped as students will able to Demonstrate NoSQL database management systems.

PO2. Problem Analysis:

CO6 strongly mapped as the Students will able to Apply NoSQL development tools on different types of NoSQL Databases. CO3 moderately mapped as students will able Analyse and implement strategies for horizontal scalability and optimize performance in a NoSQL database environment.

PO3. Design and Development:

CO2, CO3, CO4 CO6 Strongly mapped as the students will be able to perform operations on NoSQL databases, demonstrating proficiency in handling data.

PO5. Modern Tool Usage:

CO3 strongly mapped student will create databases using different tools to work with the application

PO8. Life-Long Learning:

CO3 CO6 strongly mapped as it contributes to the development of students' ability to engage in life-long learning to create software project with database management

PO9. Project Management:

CO5 strongly mapped as student can design applications or software's with database management

PO11. Innovation, employability, and Entrepreneurial skills:

CO6 strongly relate to employability skills as students are able to prepare real-world applications with database.