

**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 –V (w.e.f.A.Y.2021-2022)**

Subject Code	Subject Name	Marks			Credit
		Int	Ext	Total	
BCA3501	Android Application Programming	40	60	100	03
BCA3502	.Net Programming	40	60	100	03
BCA3503A BCA3503B	Elective: Cloud Computing Internet of Things	40	60	100	03
BCA3504A BCA3504B	Elective :Digital Marketing Machine Learning	40	60	100	03
BCA3505	Project	-	-	100	04
BCA3506	Computer Laboratory based on (3501)	40	60	100	02
BCA3507	Computer Laboratory based on (3502)	40	60	100	02
BCA3508	Computer Laboratory based on (3503)	40	60	100	02
<b>Total</b>		<b>280</b>	<b>420</b>	<b>800</b>	<b>22</b>

**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
<b>Total</b>		<b>240</b>	<b>360</b>	<b>700</b>	<b>22</b>

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

Academic Year 2021-2022

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

Paper Code : BCA3501

Title of Paper: Android Application Programming

Credit: 3

No. of. Lectures: 48

### A] Course Objective:

1. To understand the Android Operating System and develop applications using Google's Android open-source platform.
2. Creating robust mobile applications and learn how to integrate them with other services.
3. Creating intuitive, reliable mobile apps using the android services and components.
4. Create a seamless user interface that works with different mobile screens

### B] Course Outcome:

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

- CO1. Build an application using Android development environment.
- CO2. Understand the role of the Android SDK (Software Development Kit) in app development.
- CO3. Apply the method of storing, sharing and retrieving the data in Android Applications.
- CO4. Create a mobile Application by using various components like activity, views, services, content providers and receivers.
- CO5. Design and develop user interfaces for mobile apps using basic building blocks, UI components and application structure using Emulator.
- CO6. Implement activities with dialogs, spinner, fragments and navigation drawer by applying themes.
- CO7. Adapt to new features and capabilities introduced in the Android platform.

	<b>Topic/Contents</b>	
Unit 1:	<b>Introduction to Android</b>	(04L)
	1.1. Overview	
	1.2. History	
	1.3. Features of Android	
	1.4. Architecture of Android	
	1.4.1 Overview of Stack	
	1.4.2 Linux Kernel	
	1.4.3 Native Libraries	
	1.4.4 Android Runtime	
	1.4.5 Application Framework	
	1.4.6 Applications	
	1.5. SDK Overview	
	1.5.1 Platforms	
	1.5.2 Tools – (JDK, SDK, Eclipse/Android Studio, ADT, AVD, Android Emulator)	
	1.5.3 Versions	
	1.6. Creating your first Android Application.	

**Unit 2: Activities, Fragments and Intents** (05L)

- 2.1. Introduction to Activities
- 2.2. Activity Lifecycle
- 2.3. Introduction to Intents
- 2.4. Linking Activities using Intents
- 2.5. Calling built-in applications using Intents
- 2.6. Introduction to Fragments
- 2.7. Adding Fragments Dynamically
- 2.8. Lifecycle of Fragment
- 2.9. Interaction between Fragments

**Unit 3: Android User Interface** (08L)

- 3.1. Understanding the Components of a Screen
  - 3.1.1 Views and View Groups
  - 3.1.2 Linear Layout
  - 3.1.3 Absolute Layout
  - 3.1.4 Table Layout
  - 3.1.5 Relative Layout
  - 3.1.6 Frame Layout
  - 3.1.7 Scroll Layout
  - 3.1.8 Scroll View
- 3.2 Adapting to Display Orientation
  - 3.2.1 Anchoring Views
  - 3.2.2 Resizing and Repositioning
- 3.3. Managing Changes to Screen Orientation
  - 3.3.1 Persisting State Information during Changes in Configuration
  - 3.3.2 Detecting Orientation Changes
  - 3.3.3 Controlling the Orientation of the Activity
- 3.4. Utilizing Action Bar
  - 3.4.1 Adding Action Items to the Action Bar
  - 3.4.2 Customizing the Action Items and Application Icon

**Unit 4: Designing Your User Interface with Views** (10L)

- 4.1. Using Basic Views
  - 4.1.1 Text View
  - 4.1.2 Button, Image Button, Edit Text, Check Box
  - 4.1.3 Toggle Button, Radio Button, and Radio Group Views
  - 4.1.4 Progress Bar View
  - 4.1.5 Auto Complete Text View
- 4.2. Using Picker Views
  - 4.2.1 Time Picker View
  - 4.2.2 Date Picker View
- 4.3. Using List Views to Display Long Lists
  - 4.3.1 List View
  - 4.3.2 Using the Spinner View
- 4.4. Understanding Specialized Fragments
  - 4.4.1 Using a List Fragment
  - 4.4.2 Using a Dialog Fragment
  - 4.4.3 Using a Preference Fragment

Unit 5:	<b>Displaying Pictures and Menus</b>	(06L)
	5.1. Using Image Views to Display Pictures	
	5.1.1 Gallery and Image View views	
	5.1.2 Image Switcher	
	5.1.3 Grid View	
	5.2. Using Menus with Views	
	5.2.1 Creating the helper methods	
	5.2.2 Options Menu	
	5.2.3 Context Menu	
Unit 6:	<b>Databases – SQLite</b>	(04L)
	6.1. Introduction to SQLite	
	6.2. SQLite Open Helper and SQLite Database	
	6.3. Creating , Opening and Closing database	
	6.4. Working with Cursors, Insert, Update, Delete	
	6.5. Building and Executing queries	
Unit 7:	<b>Messaging and E-mail</b>	(03L)
	7.1. SMS Messaging	
	7.1.1 Sending SMS Messages Programmatically	
	7.1.2 Getting Feedback after Sending a Message	
	7.1.3 Sending SMS Messages using Intent	
	7.1.4 Receiving SMS Messages	
	7.1.5 Caveats and Warnings	
	7.2. Sending E-mail	
Unit 8:	<b>Location-Based Services and Google Map</b>	(08L)
	8.1. Display Google Maps	
	8.1.1 Creating the Project	
	8.1.2 Obtaining the Maps API Key	
	8.1.3 Displaying the Map	
	8.1.4 Displaying the Zoom Control	
	8.1.5 Changing Views	
	8.1.6 Navigating to a specific location	
	8.1.7 Adding Markers	
	8.1.8 Getting the location that was touched	
	8.1.9 Geocoding and Reverse Geocoding	
	8.2. Getting Location Data	
	8.3. Monitoring a Location	

## Reference Books

1. Beginning Android4 Application Development, By Wei-Meng Lee WILEY India  
Edition WROX Publication
2. Professional Android 4 Application Development, By Reto Meier WROX Publication
3. The official site for Android developers - <https://developer.android.co>

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

Academic Year 2021-2022

Class : T.Y.BBA (C.A.) (Semester - V) Paper Code : BCA3502

Title of Paper: .Net Programming

Credit: 3

No. of. Lectures: 48

### A] Course Objectives:

1. To introduce visual programming and event driven programming practically.
2. To enhance applications development skill of the student.
3. Understanding .NET Framework:
4. Perform basic database operations such as querying and updating data.
5. Integrate .NET applications with other technologies and platforms.

### B] Course Outcome:

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

- CO1. Implement control flow structures (if statements, loops) in .NET applications.
- CO2. Explain the components and architecture of the .NET Framework.
- CO3. Develop Desktop and Web Application.
- CO4. Demonstrate proficiency in the syntax and basic programming constructs of the .NET programming language
- CO5. Connect to databases using ADO.NET and Execute SQL queries and manipulate data in a database.
- CO6. Understand the Model-View-Controller (MVC) architecture.
- CO7. Develop a mindset for continuous learning to keep up with updates and new feature in the .NET ecosystem.

### Topic/Contents

Unit 1: **Introduction to .Net Framework**

(06L)

- 1.1 IDE (Integrated Development Environment)
- 1.2 Event Driven Programming
- 1.3 .NET Framework
- 1.4 Architecture of .Net
- 1.5 Execution Process of .Net Application
- 1.6 Features of .Net
- 1.7 Advantages of .Net
- 1.8 Develop simple .Net Application

**Unit 2: Introduction to VB.Net**

(10L)

- 2.1 Basics of VB.Net
  - 2.1.1 Operators
  - 2.1.2 Data Types
- 2.2 Control Structures
  - 2.2.1 Decision Making Statements
  - 2.2.2 Loops - for, while, do while etc.
- 2.3 Exit Statements
- 2.4 Build Console Applications
  - 2.4.1 Methods - Read(), Readline(), Write(), Writeline() etc.
- 2.5 Build Windows Applications
  - 2.5.1 Controls - Form, Text Box, Button, Label, Check Box, List box, Combo Box, Radio Button, Date Time Picker, Month Calendar, Timer, Progress bar, Scrollbar, Picture Box, Image Box, Image List, Tree View, List View, Toolbar, Status Bar, Data grid view.
  - 2.5.2 Menus and Popup Menu
  - 2.5.3 Predefined Dialog controls
  - 2.5.4 Dialog Box - InputBox(), Message Box(), MsgBox()

**Unit 3: Object Oriented Programming in VB .Net**

(06L)

- 3.1 Class and Object
- 3.2 Properties, Methods and Events.
- 3.3 Constructors and Destructors
- 3.4 Method Overloading
- 3.5 Inheritance
  - 3.5.1 MyBase , MyClass keywords.
- 3.6 Access modifiers: Public, Private, Protected, Friend.
- 3.7 Method Overriding.
- 3.8 Interfaces.
- 3.9 Polymorphism.
- 3.10 Exception Handling

**Unit 4: Architecture of ADO.Net**

(10L  
)

- 4.1 Database : Connection, Command, DataAdapter ,DataSet, DataReader, DataTable
- 4.2 Connection to database with Server Explorer
- 4.3 Multiple Table Connection
- 4.4 Data Binding with Controls like TextBox, ListBox, DataGrid.
- 4.5 Navigating Data Source
- 4.6 DataGridView, DataFormwizard, Data Validation

**Unit 5: Crystal Report**

(08L)

- 5.1 Connection to Database, Table, Queries, Building Report, Modifying Report, Formatting Fields and Object
- 5.2 Header, Footer, Working with Formula Fields, Parameter Fields, Special Fields
- 5.3 Working with Multiple Tables.

**Unit 6: ASP.Net Web Forms**

(08L)

- 6.1 Introducing ASP.NET web forms: The Role of HTTP, The Role of HTML, The Role of Client Side Scripting, Posting Back to the Web Server,
- 6.2 Interacting with the Incoming HTTP Request, Interacting with the Outgoing HTTP Response,
- 6.3 The Life Cycle of an ASP.NET Web Page, ASP.NET Web Controls,
- 6.4 Master Pages, and Themes: Understanding the Nature of Web Controls, Building the ASP.NET Cars Web Site, The Role of the Validation Controls, Working with Themes

**Reference Books:**

- 1. Programming Microsoft Visual Basic.NET – Francesco Balena
- 2. The Complete Reference -Visual Basic .NET – Jeffrey R. Shapiro
- 3. Murach’s VB.NET database programming with ADO.NET -Anne Prince and Doug Lowe
- 4. The Visual Basic.NET COACH
- 5. Visual Basic .NET 2003 in 21 Days. – Steven Holzner, SAMS Publications.
- 6. Mastering Crystal Report - BPB Publication
- 7. Crystal Report – The Complete Reference:- Tata McGraw Hill

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

Academic Year 2021-2022

Class : T.Y.BBA (C.A.) (Semester - V) Paper Code : BCA3503A

Title of Paper: **Cloud Computing**

Credit: 3

No. of. Lectures: 48

### A] Course Objectives:

1. To understand Evolution of Cloud Computing.
2. To learn and apply the Concept of Virtualization.
3. To analyze different Cloud Computing Architectures and Methods.
4. To evaluate the role of SOA and distributed Computing.
5. To learn to create applications using Parallel and Distributed Programming Concepts.

### B] Course Outcome:

Students will be able to

- CO1. Apply Virtualization Techniques.
- CO2. Analyze the different Architectures followed in Cloud Computing
- CO3. Evaluate the use of SOA and Distributed Computing.
- CO4. Develop applications using Parallel & Distributed Programming.
- CO5. Able to understand basic concepts, principles and paradigm of Cloud Computing
- CO6. Able to interpret various Cloud computing models and services.
- CO7. Able to understand the need of security in Cloud computing.
- CO8. Understand the concept SOA and cloud based storage in Cloud computing

### Topic/Contents

#### Unit 1: Introduction to Cloud (09L)

- 1.1 Scalable Computing over the Internet
- 1.2 Technologies for Network Based Systems
- 1.3 System Models for Distributed and Cloud Computing
- 1.4 Software Environments for Distributed Systems and Cloud
- 1.5 Performance, Security and Energy Efficiency
- 1.6 Clustering for Massive Parallelism
- 1.7 Computer Clusters and MPP Architecture
- 1.8 Design principles of Computer Clusters.

#### Unit 2: Virtualization (09L)

- 2.1 Implementation Levels of Virtualization
- 2.2 Virtualization Structures
- 2.3 Tools and Mechanisms
- 2.4 Virtualization of CPU, Memory, I/O Devices
- 2.5 Virtual Clusters and Resource Management
- 2.6 Virtualization for Data-Center Automation.

#### Unit 3: Cloud Architecture (10L)

- 3.1 Cloud Computing and Service Models
- 3.2 Data centered Design and Interconnection Networks
- 3.3 Architectural Design of Compute and Storage Clouds



- 3.4 Public Cloud Platforms
- 3.5 Inter Cloud Resource Management
- 3.6 Cloud Security and Trust Management.

**Unit 4: SOA for Distributed Computing** (10L)

- 4.1 Services and SOA
- 4.2 Message Oriented Middleware
- 4.3 Portals and Science Gateways
- 4.4 UDDI and Service Registries
- 4.5 Publish-Subscribe ,Metadata ,Semantic Web and Grid
- 4.6 Basic Workflow–Workflow Standards, Architecture, Specification Workflow Execution Engine.

**Unit 5: Programming Model** (10L)

- 5.1 Parallel and Distributed Programming Paradigms
- 5.2 MapReduce , Twister and IterativeMapReduce
- 5.3 Hadoop Library from Apache
- 5.4 Mapping Applications
- 5.5 Programming Support
- 5.6 Google App Engine, Amazon AWS
- 5.7 Microsoft Azure– Eucalyptus –Nimbus - Open Nebula, OpenStack.
- 5.8 CloudSim –Architecture, Cloudlets, VM creation, Broker, VM allocation ,Hosts ,Datacenter.

**Reference Book:**

1. RonaldL.Krutz, Russell DeanVines, “CloudSecurity –Acomprehensive Guide to Secure Cloud Computing”, Wiley –India, 2010.
2. John W. Rittinghouse and James F. Ransome, “Cloud Computing: Implementation, Management, and Security”, CRC Press,2010.
3. George Reese, “Cloud Application Architectures: Building Applications and Infrastructure in the Cloud”, O’Reilly, 2009.
4. RajkumarBuyya,ChristianVecchiola,S.TamaraiSelvi,“MasteringCloudComputing”,TM H, 2013.
5. James E. Smith, Ravi Nair, “Virtual Machines: VersatilePlatforms for Systems and Processes”, Elsevier/Morgan Kaufmann, 2005.
6. WilliamvonHagen,“ProfessionalXen Virtualization”,WroxPublications,2008.
7. Frank PCoyle,“XML,WebServicesandtheDataRevolution”,PearsonEducation,2007.

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

Academic Year 2021-2022

Class : T.Y.BBA (C.A.) (Semester - V) Paper Code : BCA3503B

Title of Paper: **Internet of Things**

Credit: 3

No. of. Lectures: 48

### A] Course Objectives:

1. To understand Smart Objects and IoT Architectures
2. To learn about various IoT-related Protocols
3. To build simple IoT Systems using Arduino and Raspberry Pi.
4. To understand Data Analytics and Cloud in the context of IoT
5. To develop IoT Infrastructure for popular Applications

### B] Course Outcome:

Student should be able to

- CO1. Identify the Components that forms part of IoT Architecture.
- CO2. Understand the role of sensors, actuators, and communication protocols in IoT.
- CO3. Determine the most appropriate IoT Devices and Sensors based on Case Studies.
- CO4. Setup the connections between the Devices and Sensors.
- CO5. Evaluate the appropriate Protocol for Communication between IoT.
- CO6. Analyze the Communication Protocols for IoT.
- CO7. Diagnose and troubleshoot issues in IoT systems.

### Topic/Contents

#### Unit 1 Fundamentals of IoT

(09L)

Evolution of Internet of Things

- 1.1 Enabling Technologies
- 1.2 IoT Architectures: oneM2M, IoT World Forum (IoTWF) and Alternative IoT models
- 1.3 Simplified IoT Architecture and Core IoT Functional Stack
- 1.4 Fog, Edge and Cloud in IoT
- 1.5 Functional Blocks of an IoT Ecosystem
- 1.6 Sensors, Actuators, Smart Objects and Connecting Smart Objects
- 1.7 Security Concerns and Challenges

#### Unit 2: IOT Protocols

(09L)

- 2.1 IOT Access Technologies: Physical and MAC layers, Topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and Lora WAN
- 2.2 Network Layer: IP versions, Constrained Nodes and Constrained Networks
- 2.3 Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks
- 2.4 Application Transport Methods: Supervisory Control and Data

Acquisition  
2.5 Application Layer Protocols: CoAP and MQTT

**Unit 3: Design & Development** (09L)

- 3.1 Design Methodology
- 3.2 Embedded Computing Logic
- 3.3 Micro-Controller, System on Chips
- 3.4 IOT system Building blocks
- 3.5 Arduino
- 3.6 Board details, IDE Programming
- 3.7 Raspberry Pi
- 3.8 Interfaces and RaspberryPi with Python Programming.

**Unit 4: Data Analytics And Supporting Services** (09L)

- 4.1 Structured Vs Unstructured Data
- 4.2 Data in Motion Vs Data in Rest
- 4.3 Role of Machine Learning
- 4.4 NoSQL Databases
- 4.5 Hadoop Ecosystem
- 4.6 Apache Kafka, Apache Spark
- 4.7 Edge Streaming Analytics and Network Analytics
- 4.8 Xi vely Cloud for IoT, Python Web Application Framework
- 4.9 Django
- 4.10AWS for IOT
- 4.11 System Management with NETCONF
- 4.12 YANG

**Unit 5: Case Studies/ Industrial Applications** (12L)

- 5.1 Cisco IOT System
- 5.2 IBM Watson IOT Platform
- 5.3 Manufacturing
- 5.4 Converged Plant wide Ethernet Model (CPwE)
- 5.5 Power Utility Industry
- 5.6 Grid Blocks Reference Model
- 5.7 Smart and Connected Cities: Layered Architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control

**Reference Books:**

1. ArshdeepBahga, VijayMadiseti,—Internet of Things—Ahands-on approach, Universities Press,2015
2. Olivier Hersent,David Boswarthick,OmarElloumi ,—TheInternetof Things—Key applications and Protocols, Wiley, 2012 (for Unit 2).

3. Jan Höller, Vlasios Tsiatsis, Catherine Mulligan, Stamatis Karnouskos, Stefan Avesand, David Boyle, “From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence”, Elsevier, 2014.
4. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), —Architecting the Internet of Things, Springer, 2011.
5. Michael Margolis, Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, O’Reilly Media, 2011.
6. Dieter Uckelmann, Mark Harrison, Florian Michahelles, Architecting the Internet of Things, Springer publications.
7. Marco Schwartz, Internet of Things with Arduino Cookbook, Packt Publications.
8. Internet of Things and Data Analytics, Wiley Publications.

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

**Academic Year 2021-2022**

Class : T.Y.BBA (C.A.) (Semester - V) Paper Code : BCA3504A

Title of Paper: **Digital Marketing**

Credit: 3

No. of. Lectures: 48

### **A] Course Objectives:**

1. To give knowledge about using Digital Marketing in and as Business.
2. To make SWOT Analysis, SEO Optimization and use of various Digital Marketing tools
3. To create a Measurable and Goal Oriented Website or Marketing Plan.
4. to equip students with the ability to understand and subsequently create strategic and targeted campaigns using digital media tools.

### **B] Course Outcome:**

Student should be able to

- CO1. Explain why we get a huge list of Webpages as a result of a Search.
- CO2. Examine why a certain Webpage is ranked higher compared to others.
- CO3. Organize how we can ethically boost the ranking of our Webpage.
- CO4. Describe some of the latest Technologies used in Digital Marketing.
- CO5. Conduct market research using digital tools and techniques.
- CO6. Develop and implement a content marketing strategy.
- CO7. Effectively communicate digital marketing strategies and results.

### **Topic/Contents**

<b>Unit 1:</b>	<b>Introduction</b>	<b>(04L)</b>
	1.1 Understanding Internet Marketing	
	1.2 Search Engine Optimization	
	1.3 Search Engine Marketing	
	1.4 Email Marketing	
	1.5 Digital Display Marketing	

- Unit 2: **Introduction to New Age Media (Digital) Marketing** (04L)  
2.1 What is Digital Marketing  
2.2 Digital vs. Real Marketing  
2.3 Digital Marketing Channels  
2.4 Types of Digital Marketing(Overview)-Internet Marketing ,  
Social Media Marketing, Mobile Marketing
- Unit 3: **Creating Initial Digital Marketing Plan** (04L)  
3.1 Content Management  
3.2 SWOT Analysis: Strengths, Weaknesses, Opportunities, and  
Threats  
3.3 Target Group Analysis EXERCISE: Define a Target Group
- Unit 4: **Marketing using Web Sites** (04L)  
4.1 Web Design  
4.2 Optimization of Web sites  
4.3 MS Expression Web EXERCISE: Creating web sites, MS  
Expression

Unit 5: **Search Engine Optimization** (04L)  
5.1 SEO Optimization  
5.2 Writing the SEO Content EXERCISE: Writing the  
SEO Content

Unit 6: **Customer Relationship Management** (04L)  
6.1 Introduction to CRM  
6.2 CRM platform  
6.3 CRM models EXERCISE: CRM Strategy

Unit 7: **Social Media Marketing** (20L)  
7.1 Understanding Social Media Marketing  
7.2 Social Networking (Facebook, LinkedIn, Twitter, etc.)  
Social Media (Blogging, Video Sharing - Youtube,  
Photosharing – Instagram, Podcasts)  
7.3 Web Analytics - levels  
7.4 Modes of Social Media Marketing  
7.4.1 Creating a Facebook page Visual identity of a Facebook  
page , Types of publications, Facebook Ads , Creating  
Facebook Ads , Ads Visibility  
7.4.2 Business opportunities and Instagram options  
Optimization of Instagram profiles , Integrating Instagram  
with a Web Site and other social Networks ,Keeping up  
with posts  
7.4.3 Business tools on LinkedIn Creating Campaigns  
on LinkedIn , Analysing Visitation on LinkedIn  
7.4.4 Creating Business accounts on YouTube,  
YouTube- Advertising , YouTube Analytics  
7.4.5 E-mail Marketing E-mail Marketing plan , E-  
mail Marketing Campaign Analysis , Keeping  
up with Conversions  
7.5 Digital Marketing tools: Google Ads, FaceBook Ads,  
Google Analytic, Zapier, Google Keyword Planner  
EXERCISE:  
Social Media Marketing plan. EXERCISE:  
Making a Facebook page and Google Ads

Unit 8: **Digital Marketing Budgeting** (04L)  
8.1 Resource Planning  
8.2 Cost Estimating  
8.3 Cost Budgeting  
8.4 Cost Control

**Reference Books:**

- 1) Digital Marketing for Dummies By Ryan Deiss and Russ Hennesberry
- 2) Advertising and Promotion: An Integrated Marketing Communications Perspective,  
George Belch, San Diego University Michael Belch, San Diego University
- 3) Advertising Management: Rajeev Batra, John G. Myers, David A. Aaker
- 4) Belch: Advertising & Promotions (TMH) 5) The Social Media Bible: Tactics,  
Tools, & Strategies for Business Success by Lon Safko 6) Web Analytics 2.0 –  
Avinash Kaushik



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

Academic Year 2021-2022

Class : T.Y.BBA (C.A.) (Semester - V) Paper Code : BCA3504B

Title of Paper: **Machine Learning**

Credit: 3

No. of. Lectures: 48

### A] Course Objectives:

1. To study the basics of Machine Learning.
2. To learn Linear Models.
3. To understand distance-Based Clustering Techniques.
4. To know about Tree and Rule-Based Models.
5. To understand Ensemble Learning.

### B] Course Outcome:

Students should be able to

- CO1. Understand the Concepts of Machine Learning
- CO2. Apply the Linear Modelling Techniques to solve a Problem
- CO3. Understand Distance-Based Clustering Techniques
- CO4. Design Tree and Rule-Based Models
- CO5. Apply machine learning techniques to real-world problems.
- CO6. Describe and compare various machine learning algorithms, such as linear regression, decision trees, support vector machines, and neural networks.
- CO7. Understand the strengths and weaknesses of different algorithms in different contexts.

### Topic/Contents

#### Unit 1: **Introduction to Machine Learning** (09L)

- 1.1 Task: Problems solved with Machine Learning, Looking for Structure, Performance Evaluation -
- 1.2 **Models:** Geometric Models, Probabilistic Models, Logical Models, Grouping and Grading
- 1.3 Features
- 1.4 Binary Classification: Classification, Scoring and Ranking, Class Probability Estimation
- 1.5 Handling more than Two Classes
- 1.6 Regression-Movie genre Identification and Rating System

#### Unit 2: **Linear Models** (09L)

- 2.1 Concepts: Supervised, Unsupervised and Descriptive Learning
- 2.2 Hypothesis Space
- 2.3 Linear Classification
  - 2.3.1 Univariate Linear Regression
  - 2.3.2 Multivariate Linear Regression
  - 2.3.3 Logistic Regression
- 2.4 Perceptron
- 2.5 Multilayer Neural Networks
- 2.6 Learning Neural Networks Structures
- 2.7 Support Vector Machines
- 2.8 Credit Card Approval System

- Unit 3: Distance Based Models** (10L)
- 3.1 Distance and Measure
  - 3.2 Neighbors and Examples
  - 3.3 Nearest Neighbor Classification
  - 3.4 Distance Based Clustering: K-means Algorithm, Clustering around Medoids
  - 3.5 Clustering using Kernels
    - 3.5.1 Silhouettes
    - 3.5.2 Hierarchical Clustering
    - 3.5.3 Document Clustering
- Unit 4: Tree & Rule Models** (10L)
- 4.1 Decision Trees
  - 4.2 Ranking and Probability Estimation Trees
  - 4.3 Regression Trees
  - 4.4 Clustering Trees
  - 4.5 Ordered Rule lists
  - 4.6 Unordered Rulelists
  - 4.7 Descriptive Rule
  - 4.8 First- order Rule
  - 4.9 Spam Filtering
- Unit 5: Model Ensembles** (10L)
- 5.1 Features
    - 5.1.1 Kinds of Feature
    - 5.1.2 Feature Transformation
    - 5.1.3 Feature Construction and Selection
  - 5.2 Ensemble Learning: Bagging and Random Forests
  - 5.3 Boosting: Boosted Rule Learning
  - 5.4 Mapping the Ensemble Landscape : Bias, Variance, Margin, other ensembleMethods
  - 5.5 Meta Learning-Diabetes Diagnosis System.

**Reference Book:**

1. Brink Henrik, Richards Joseph W & Fetherolf Mark, "Real-World Machine Learning", 2nd Edition, Drea mtech Press, 2017
2. Manaranjan Pradhanand Dinesh KumarU., "Machine LearningusingPython", Wiley India Pvt.Ltd.,2019.
3. K.P. Murphy, "MachineLearning:Aprobabilistic perspective", MITPress,2012.
4. C. M.Bishop, "Pattern Recognitionand MachineLearning", Springer, 2007.M.Mohri,A. Rostamizadeh,andA.Talwalkar, "FoundationsofMachineLearning", MITPress,2012.
5. Peter Flach ,Machine Learning-The Art and Science of Algorithms that make sense

**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 : BCA3505

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, Execution estimation, 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] Course Outcomes:**

Student should 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:

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

## **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 : BCA3506

Title of Paper: Computer Laboratory based on (3501)

Credit: 2

No. of. Lectures: 48

#### **Course Objective:**

1. Creating robust mobile applications and learn how to integrate them with other services
2. Creating intuitive, reliable mobile apps using the android services and components
3. Create a seamless user interface that works with different mobile screens
4. Create an Android application for data storage using SQLite.

#### **Course Outcomes:**

Students should 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. Create application using linear layout for addition of two number and display result by using toast.
2. Create a Simple Application Which Send —Hello message from one activity to another with help of Button (Use Intent).
3. Create application using linear layout for multiplication of two number and display result by using toast.
4. Create a Simple Application, which read a positive number from the user and display its factorial value in another activity
5. Create following Vertical Scroll View in Android.
6. Create an application to create Login Form using LinearLayout
7. Create an Android Application that Demonstrate ContextMenu for a Button having menu items file ,edit, view.
8. Design a Registration form having name, surname, sex, address, phone number. Use appropriate widget.
9. Create a application of basic arithmetic operations
10. Create an app that uses radiobutton group of all courses in your college. On selecting one of the buttons, the selected of that course should be displayed in a textview control at the bottom of the screen.
11. Create an application that takes the name from a text box and shows hello message along with

- the name entered in text box, when the user clicks the OK button.
12. Create a screen that has input boxes for User Name, Password, Address, Gender(radio buttons for male and female), Age (numeric) and a Submit button. On clicking the submit button, print all the data below the Submit Button
  13. Create an application to accept Movie details like Name, Release Year, Collection and display the same information on the next activity using TableLayout.
  14. Use linear layout to create a simple application that will take the contents of a predefined textview and use a button to cause the application to take that text, convert it to uppercase, and display it in an edittext field
  15. Create an Android Application that Demonstrate ContextMenu
  16. Create a spinner application with strings taken from resource directory res/values/strings.xml and on changing the spinner value, image will change. Image is saved in the drawable directory.
  17. Design an application to accept temperature in Fahrenheit and convert into Celsius. Use TableLayout
  18. Create an Android Application that Demonstrate Custom ListView which shows the BookName and Author Name
  19. Construct an Android Application to accept a number and calculate Factorial and Sum of Digits of a given number using Context Menu.
  20. Create an Android App, it reads the Students Details (Name, Surname, Class, Gender, Hobbies, Marks) and Display the all information in another activity in table format on click of Submit button
  21. Create an Android App with Login Screen. On successful login, gives message go to next Activity (Without Using Database& use Table Layout).
  22. Design Screens Using RadioButtons & CheckBoxes. Display the selected text using Toast
  23. Construct an application to accept a number and calculate Palindrome and Reverse and Reverse of a number using Menu.
  24. Create First Activity to accept information of Employee First Name, Middle Name, Last Name, Date of birth, Address, Email ID and display all information on Second Activity when user click on Submit button.
  25. Create an Android application to demonstrate phone call using Implicit Intent.

## **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 : BCA3507

Title of Paper: Computer Laboratory based on (3502)

Credit: 2

No. of. Lectures: 48

#### **A] Course Objectives:**

1. Explain the architecture of Dot Net Technology.
2. Develop form based simple Net applications using basic and advanced control
3. Develop multiple form and menu based .Net applications
4. Develop ADO.Net based database
5. Implement and trouble shoot simple .Net Applications

#### **B] Course Outcome:**

Student should be able to :

- CO1. Set up and configure a .NET development environment, including the installation of Visual Studio or Visual Studio Code.
- CO2. Use Visual Studio IDE to design application.
- CO3. Develop GUI Application using Form Controls and its events.
- CO4. Apply Object Oriented concepts in GUI Application.
- CO5. Use Data access controls to store data in Database and retrieve it.
- CO6. Use Data Binding in GUI Application
- CO7. Understand deployment considerations for different types of .NET applications.

#### **Practical Assignment on**

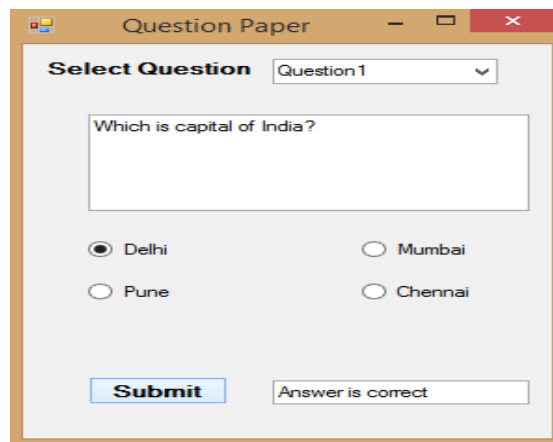
1. Write a Vb.net program to check whether entered string is palindrome or not.
2. Write a Vb.net program for blinking an image.
3. Write a Vb.Net program to move the Text "TC College" continuously from Left to Right.
4. Write a Vb.net program to accept a number from an user through InputBox and display its multiplication table into the ListBox.
5. Write a Vb.net program to accept n numbers through InputBox and count the number of Armstrong and Perfect numbers among them and display their count by using messagebox
6. Write a Vb.net program to add two TextBoxes, two Labels and one button at runtime. Accept two numbers in textboxes and handle DivideByZeroException.
7. Write a Vb.net program to design following screen, accept the details from the user. Clicking on Submit button Net Salary should be calculated and displayed into the TextBox. Display the MessageBox informing the Name and Net Salary of employee.

8. Write a Vb.net program to accept number from user into the TextBox. Calculate the square root of that number also convert the entered number into binary number and display result into the Message Box
9. Design a Vb.net form to pick a date from DateTimePicker Control and display day, month and year in separate text boxes.
10. Write a Vb.net program to accept a character from keyboard and check whether it is vowel or not. Also display the case of that character.
11. Write a Vb.net program to accept sentences in text box and count the number of words and display the count in message box.
12. Write a Vb.net program to design the following form, accept the numbers through textbox and add them into the ListBox1 by clicking on Add button. When user click on Prime button then all the prime numbers from ListBox1 should get added into ListBox2.

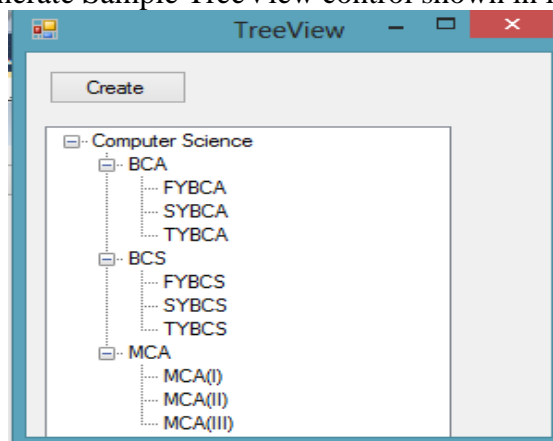
13. Write a Vb.net program to design the following form, allow the user to select radio buttons from Gender and Age Panel. After Selection appropriate CheckBox from Right Panel should be selected automatically. Display appropriate message into the MessageBox by clicking on Ok button.

14. Write a Vb.net program to design the following form, select the question number from combo box that question will be displayed into textbox and the options for that question will be

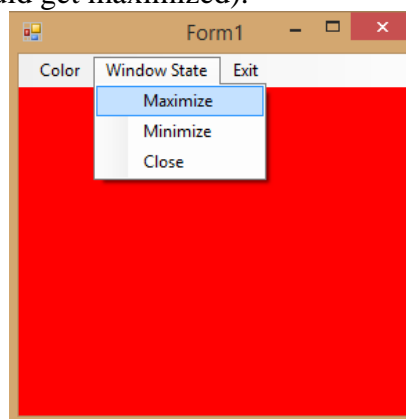
displayed on four radio buttons, select option and click on submit button result should be displayed in another textbox.



15. Write a Vb.net program to generate Sample TreeView control shown in following form:



16. Write a Vb.net program to design the following form, it contains the three menus Color (Red,Blue,Green) ,Window(Maximize, Minimize, Restore) and Exit. On Selection of any menu or submenu result should affect the form control( for example if user selected Red color from Color menu back color of form should get changed to Red and if user selected Maximize from Window Menu then form should get maximized).



17. Write a Vb.net program to design the following form, this program shows the details of students in the form of form (use split container or Groupbox control to separate the input and output session).



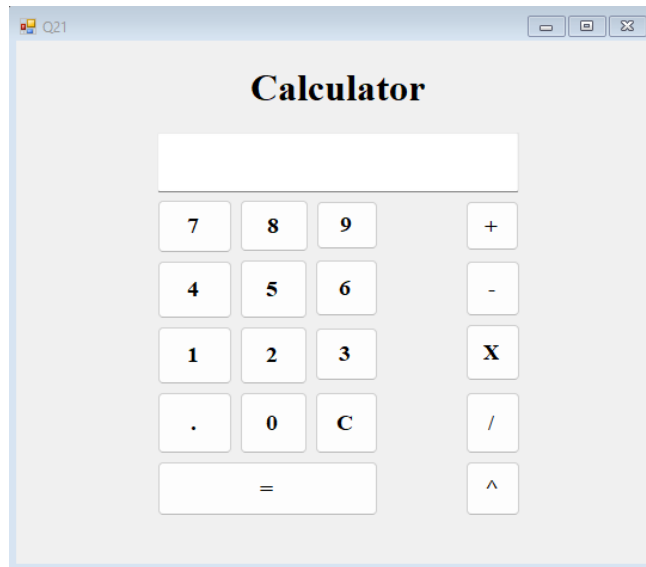
18. Write a Vb.net program to design the following form, accept all details from user and display the details through message box.

19. Develop the menu based Vb.net application to implement a text editor with cut, copy, paste, save, close operations.

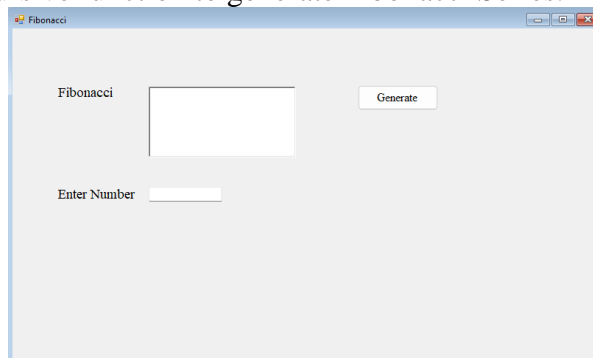
20. Write a VB.NET program to do the following operations on RichTextBox values

- i) Font Style
- ii) Font Color
- iii) Save
- iv) Open

21. Create a project to design a calculator using control array



22. Write a program, using recursive function to generate Fibonacci Series.



23. Write a program to calculate pay that takes two parameters hours and wages and display the total pay of an employee.
24. Write a program to print first n square less than 50 and print the sum of the all the square of the n number
25. Create a project for book sales. Make text boxes for quantity, title and price with labels. Calculate total price, discount (15%) and discounted price.
26. Create a text editor application. It should perform operation like cut, copy, paste and change in font, color of the selected text. Also implement new open and save-file menuoption. Write a program to implement the concept of function overloading.
27. Using exception handling write a program to divide two numbers
28. Currency Conversion
29. Write a VB.NET program to create a table Patient (Pid, PName, Contact\_No, Disease). Insert records into table and display appropriate message in message box. (Use MS Access to create db)
30. Write a VB.NET program to create a table Employee (Eid, EName, Designation, doj). Insert records into table and display it in GridView. (Use SQLServer to create db)
31. Write a VB.NET program to create a table student (RollNo ,SName, Class). Insert the records (Max: 5). Update class of students to 'TYBCA' whose class is 'SYBCA' and display updated records in GridView. (Use MS Access to create db)
32. Write a VB.NET program to create teacher table (Tid ,TName, subject). Insert the records (Max : 5). Search record of a teacher who teaches "VB.NET" subject and display result in GridView. (Use SQL to create db).
33. Write a VB.NET program to create movie table (Mv\_Name, Release\_year, Director). Insert the records(Max: 5). Delete the records of movies whose release year is 2015 and display

- appropriate message in message box.(Use MS Access to create db)
34. Write a VB.NET program to accept the details of customer (CName, Contact\_No, Email\_id). Store it into the database with proper validation and display appropriate message by using MessageBox.(Use MS Access )
  35. Write a VB.NET program to accept the details of product (pid, pname, expiry\_date, price). Store it into the database and display it on the Crystal Report. (Use SQL Server)
  36. Write a VB.NET program to accept the details Supplier (SupId, SupName, Phone\_No, Address) store it into the database and display it. (Use Crystal Report)
  37. Write a VB.NET program to create Author table (aid ,aname , book\_name). Insert the records (Max 5). Delete a record of author who has written “VB.NET book” and display remaining records on the Crystal Report. (Use MS Access to create db)
  38. Write a VB.NET program to create player table (Pid,PName,Game, no\_of\_matches). Insert records and update number of matches of ‘Sachin Tendulkar’ and display result in Crystal Report. (Use SQL to create db)

## 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 : BCA3508

Title of Paper: Computer Laboratory based on (3503A)

Credit: 2

No. of. Lectures: 48

#### A] Course Objectives:

1. To implement Client Server communication model using TCP.
2. To implement Web Service.
3. To understand Basics of cloud computing and different Cloud computing services.
4. To compare and contrast different types of Clouds.
5. To build Private Cloud and broadly educate to know the impact of engineering on legal and societal issues involved.
6. To learn how to use Cloud Services.

#### B] Course Outcomes:

Student should be able to:

- CO1. Understand the basic concepts and services offered by major cloud platforms such as Amazon Web Services (AWS), Microsoft Azure, or Google Cloud Platform (GCP).
- CO2. Create and manage user accounts, permissions, and access controls within a cloud platform.
- CO3. Deploy virtual machines (VMs) and containers on cloud infrastructure.
- CO4. Implement security best practices, including encryption, identity and access management, and network security.
- CO5. Analyze real-world case studies and scenarios involving cloud computing.
- CO6. identify core concepts of the cloud computing paradigm, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
- CO7. Utilize cloud storage services for object storage, block storage, and file storage. Implement data backups and versioning.

#### Practical Assignments:

1. To study of cloud computing & its architecture
2. To study the storage as a service using Google [GSP]
3. Create a word document of your class timetable & store locally & upload on cloud with doc & pdf Format.
4. Create a spreadsheet which contain employee salary information & calculate gross & total salary using formula using google cloud. [SaaS]
5. Prepare a PPT on Cloud Computing models services & architecture. PPT should contain explanation, images & at least 15 slides using Google Service Provider [SaaS].
6. Create your resume in a neat format using Google Cloud Programs.
7. Using SaaS by google create a form & share it using cloud.
8. To study installation of virtual machine using VMware & find procedure to install VMware Workstation with different flavors of Linux or windows OS.
9. Create a virtual machine using oracle virtual box.
10. Creating an AWS account & study of S3 Service.
11. Creating bucket & setting permissions for general users to access that bucket using S3.
12. Creating Bucket & implementing bucket versioning & deletion of object & bucket in S3.
13. Using AWS S3 hosting static website.
14. Creating Account of Microsoft 365.
15. Installation & Configure of Dropbox [Storage as a service].

**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:**

Student should 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 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

## 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:

Student should 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

<b>Unit 1:</b>	<b>Introduction to NOSQL</b>	<b>(10L)</b>
	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	



<b>Unit 2:</b>	<b>NOSQL Basics</b> 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 Data 2.6 Sets.	<b>(10L)</b>
<b>Unit 3:</b>	<b>Advanced NOSQL</b> 3.1 NOSQL in Cloud 3.2 Parallel Processing with Map Reduce 3.3 Big Data with Hive	<b>(09L)</b>
<b>Unit 4:</b>	<b>Working with NOSQL</b> 4.1 Surveying Database 4.2 Migrating from RDBMS to NOSQL 4.3 Web Frameworks and NOSQL 4.4 Using MYSQL as a NOSQL	<b>(09L)</b>
<b>Unit 5:</b>	<b>Developing Web Application with NOSQL and NOSQL Administration</b> 5.1 PHP and MongoDB 5.2 Python and MongoDB 5.3 Creating Blog application with PHP 5.4 NOSQL Database Administration	<b>(10L)</b>

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 9781935504702

## 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:

Student should 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

## **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: **BlockChain**

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:**

Student should 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:	<b>Introduction to Blockchain</b>	(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	
	1.10. Security	
	1.10.1.DDos	
	1.11 Cryptocurrency	
	1.12.Digital Token	
Unit 2:	<b>How Blockchain Works</b>	(12L)
	2.1 How Block chain Works	
	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:	<b>Introduction to Bitcoin</b> 3.1 Currency 3.2 Double Spending 3.3 Cryptocurrency 3.4 P2P Payment Gateway 3.5 Wallet 3.6 Mining	(08L)
Unit 4:	<b>Ethereum</b> 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	(08L)
Unit 5:	<b>Introduction to Hyperledger Fabric V1</b> 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	(08L)

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 Tiziana Cimoli, A survey of attacks on Ethereum smart contracts

**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:**

Student should 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**

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

<b>Unit 3:</b>	<b>Classification</b>	(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	
<b>Unit 4:</b>	<b>Association Analysis</b>	(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	
<b>Unit 5:</b>	<b>Cluster Analysis</b>	(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	
<b>Unit 6:</b>	<b>Visualization</b>	(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



## 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] Learning 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] Learning Outcome:

Student should 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 Alpaydin, 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. 9780262035613.

**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:**

Student should 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:

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

## 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: 30

#### 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:

##### Students able to:

- CO1: Build basic applications with Python Numpy and Pandas Library.
- CO2: Understand basics of data visualization & various methods of data visualizations.
- CO3: Understand Searching & Sorting methods of series & data frame.
- CO4: Understand how to Build Machine Learning Models.
- CO5: Explain and use of various python library for solving real life problems.
- CO6: Make data visualizations using various methods.
- CO7: Check the accuracy of various ML models for real life problems solving.

#### 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  $=a+(2*b)+(3*c)$ .

## **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: 30

### **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:**

Students should 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 keeps 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 DebitCard 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) 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.