Anekant Education Society's

Tuljaram Chaturchand College of Arts, Science and Commerce,

Baramati.

SYLLABUS STRUCTURE OF

Bachelor of Business Administration (Computer Application)

Syllabus (CBCS Pattern) under Academic Autonomy for the year 2021-2022

T.Y.BBA (CA)

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
	Total	280	420	800	22

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	-	-	-	1 02
	Total	240	360	700	22

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] Learning Objective:

To understand the Android Operating System and develop applications using Google's Android open-source platform

B] Learning Outcome:

Student should be able to develop Android Applications

Topic/Contents

Unit 1:   **Introduction to Android**   (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 ViewGroups
    3.1.2 LinearLayout
    3.1.3 AbsoluteLayout
    3.1.4 TableLayout

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Unit 7: **Messaging and E-mail**   (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: **Location-Based Services and Google Map**   (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] Learning Objectives:

1. To introduce visual programming and event driven programming practically.

2. To enhance applications development skill of the student.

B] Learning Outcome:

   Student should be able to

 1. Develop Desktop Application.

 2. Develop Web Application.

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, TextBox, Button, Label, CheckBox, Listbox, ComboBox, RadioButton, DateTimePicker, MonthCalender, Timer, Progressbar, Scrollbar, PictureBox, ImageBox, ImageList, TreeView, ListView, Toolbar, StatusBar, Datagridview.

       2.5.2   Menus and PopUp Menu

       2.5.3   Predefined Dialog controls

       2.5.4   DialogBox - InputBox(), MessageBox(), 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 – Jefrey 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] Learning 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] Learning Outcome:

Students will be able to
1. Understand how Cloud Computing has evolved.
2. Apply Virtualization Techniques.
3. Analyze the different Architectures followed in Cloud Computing
4. Evaluate the use of SOA and Distributed Computing.
5. Develop applications using Parallel & Distributed Programming.

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 centerd Design and Interconnection Networks
         3.3 Architectural Design of Compute and Storage Clouds

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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 - OpenNebula,
            OpenStack.
        5.8 CloudSim –Architecture , Cloudlets ,VM creation ,Broker,VM
            allocatio ,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",TMH,

    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] Learning 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] Learning Outcome:

Student should be able to

1. Identify the Components that forms part of IoT Architecture.
2. Determine the most appropriate IoT Devices and Sensors based on Case Studies.
3. Setup the connections between the Devices and Sensors.
4. Evaluate the appropriate Protocol for Communication between IoT.
5. Analyze the Communication Protocols for IoT.

Topic/Contents

Unit 1   Fundaments 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 Raspberry Pi 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 No SQL 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
4.10 AWS 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 Plantwide Ethernet Model (CPwE)
5.5 Power Utility Industry
5.6 GridBlocks Reference Model
5.7 Smart and Connected Cities: Layered Architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control

Reference Books:

1. ArshdeepBahga, VijayMadisetti,—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 Ho¨ ller, VlasiosTsiatsis,CatherineMulligan,Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine tothe Internet of Things –Introductiontoa New Ageof Intelligence",Elsevier,2014.

4. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), ―Architecting the Internet of Thi ngs, Springer,

   2011.

5. Michael Margolis, Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your Projects, 2 nd Edi tion, O'ReillyMedia, 2011.

6. Dieter Uckelmann, Mark Harrison, Florian Michahelles, Architecting the Internet of Things, Springer publications.

7. Marco Schwatrz, 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] Learning 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.

B] Learning Outcome:
   Student should be able to
1. Explain why we get a huge list of Webpages as a result of a Search.
2. Examine why a certain Webpage is ranked higher compared to others.
3. Organize how we can ethically boost the ranking of our Webpage.
4. Describe some of the latest Technologies used in Digital Marketing.

	Topic/Contents	
Unit 1:	**Introduction**	(04L)
	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 – AvinashKaushik

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] Learning 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 EnsembleLearning.

B] Learning Outcome:

Students should be able to

1. Understand the Concepts of Machine Learning
2. Apply the Linear Modelling Techniques to solve a Problem
3. Understand Distance-Based Clustering Techniques
4. Design Treeand Rule-Based Models
5. Apply EnsembleLearning Techniques

Topic/Contents

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

    1.1 Task: Problems solvedwith 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 morethan Two Classes

    1.6 Regression-Moviegenre 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 ensemble Methods

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 Data

SYLLABUS (CBCS) FOR T.Y.BBA (C.A.) (w. e. from June, 2021)
Academic Year 2021-2022

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

Paper Code   : BCA3601

Title of Paper: **Data Analytics using python**

Credit: 3   No. of. Lectures: 48

A] Learning 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] Learning Outcome:
Student should be able to
1. Know demonstrate Proficiency with Statistical Analysis of Data.
2. Use the Skill in Data Management Technologies
3 . Develop and apply Data Science Concepts and Methods to solve Problems
   in real world

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 Leaning

2.2 Supervised Machine Learning K- Nearest-
      Neighbours, Naïve Bayes Decision Tree Support
      Vector Machines

2.3 Unsupervised Machine Learning, Cluster Analysis,
      K means, Association Rule Mining

2.4 Apriori Algorithms

2.5 Regression Analysis
      Linear Regression, Nonlinear Regression

Unit 3: **Data Analytics with Python Programming Numpy** (12L)

3.1 Arrays

3.2 Array indexing

3.3 Datatypes

3.4 Array math o Broadcasting

3.5 SciPy

3.6 Image Operations

3.7 Distance between Point

3.8 Data Analysis and Manipulation using Pandas-

   Importing Data

   Creating A Data Frame

   Data Frame Methods

   Indexing Data Frames

   Boolean Indexing

   Indexing Using Labels

   Multi-Indexing

   Merge Data Frames

   Sorting Data Frames

   Apply Function

   Pivot Table

   Crosstab

   Iterating over rows of a Data Frame

Unit 4: **Data Visualization** (12L)

4.1 Basic Principles

4.2 Ideas and tools for Data Visualization Graph

4.3 Visualization

4.4 Data Summaries

4.5 Model Checking & Comparison

4.6 Purpose of Visualization

4.7 Multidimensional Visualization

4.8 Tree Visualization

4.9 Graph Visualization

4.10 Visualization Techniques

4.11 Understanding Analytics output and their usage

4.12 Scikit Package

4.13 matplotlib Library

4.14 Plotting

4.15 Subplots Image

Reference Books:

1. The elements of statistical learning. Hastie, Trevor, et al., Vol. 2. No. 1. New York: springer, 2009.

2. Applied statistics and probability for engineers. Montgomery, Douglas C., and George C. Runger. John Wiley & Sons,2010

3. Scaling up Machine Learning to White "Hadoop: The Definitive Guide" Third Edition, Bekkerman et al., O"reilly Media, 2012.

4. "Mining of Massive Datasets", Anand Rajaraman and Jeffrey David Ullman, Cambridge University Press, 2012. 5. Developing Analytic Talent: Becoming a Data Scientist, Vincent Granville, wiley, 2014

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] Learning 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 tore and Amazon Simple DB.
3. Students will also learn various CRUD operations and the querying Mechanisms in NOSQL

B] Learning Outcome:

Student should be able to
1. Assimilate fundamental concepts in the context of a number of different NOSQL products.
2. Construct refined Logical database Model with consideration of Data Semantics and dependency.
3. Execute various CRUD operations with MongoDB.
4. Build a database System and demonstrate competence with the fundamental tasks involved with its Modeling, Designing, and Implementation.
5. Use the MongoDB tools to develop and deploy your Applications.
6. Implement Java/ Python / PHP web Application for a real world Problem with MongoDB.

Topic/Contents

Unit **1:**

Introduction to NOSQL
1.1 Definition of NOSQL   **(10L)**
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

Unit **2:**

NOSQL Basics
2.1 Understanding the NOSQL Architecture
2.2 Performing CRUD operations   **(10L)**
2.3 Querying NOSQL Stores
2.4 Modifying Data Stores and Managing Evolution
2.5 Indexing and Ordering Data

2.6 Sets.

Unit 3:   **Advanced NOSQL**   **(09L)**
    3.1 NOSQL in Cloud
    3.2 Parallel Processing with Map Reduce
    3.3 Big Data with Hive

Unit 4:   **Working with NOSQL**   **(09L)**
    4.1 Surveying Database
    4.2 Migrating from RDBMS to NOSQL
    4.3 Web Frameworks and NOSQL
    4.4 Using MYSQL as a NOSQL

Unit 5:   **Developing Web Application with NOSQL and NOSQL Administration**   **(10L)**
    5.1 PHP and MongoDB
    5.2 Python and MongoDB
    5.3 Creating Blog application with PHP
    5.4 NOSQL Database Administration

Reference Books:

1. David Hows, "The definitive guide to MongoDB", 2nd edition, Apress Publication, 2009, 8132230485.

2. Shakuntala Gupta Edward, "Practical Mongo DB ", Second edition, Apress Publications, 2016, ISBN 1484206487

3. Daniel Perkins,"MongoDB, Third Edition, CreateSpace Independent Publishing Platform, 2016, ISBN 152396300

4. Steve Hoberman, "Data Modelling for Mongo DB", First Edition, Technics Publication, 2014, ISBN 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] Learning 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.

B] Learning Outcome:

Student should be able to
1. Identify Big Data and its Business Implications.
2. List the Components of Hadoop and Hadoop Eco-System
3. Access and Process Data on Distributed File System Manage Job Execution in Hadoop Environment
4. Develop Big Data Solutions using Hadoop Eco System
5. Apply Machine Learning Techniques using R.

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] Learning Objectives:

1. To Understand how Blockchain Systems (mainly Bitcoin and Ethereum) work,
2. To Securely interact with them,
3. To Design, build, and Deploy smart contracts and Distributed Applications,
4. To integrate ideas from blockchain Technology into their own Projects.

B] Learning Outcome:

Student should be able to
1. Understand what Blockchain is and why it is used
2. Explain the different Components involved within Blockchain
3. Know when and why you may want to use Blockchain within your environment

Topic/Contents

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

1.11 Cryptocurrency
1.12.Digital Token

Unit 2:   **How Blockchain Works**   (12L)

2.1 How Blockchain 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:   **Introduction to Bitcoin**   (08L)

3.1 Currency
3.2 Double Spending
3.3 Cryptocurrency
3.4 P2P Payment Gateway
3.5 Wallet
3.6 Mining

Unit 4:   **Ethereum**   (08L)

4.1. Ethereum Network
4.2. EVM
4.3.Transaction Fee
4.4.Mist
4.5. Ether, Gas
4.6. Solidity - Smart Contracts
4.7.Truffle
4.8. Web3
4.9. Design and Issue Cryptocurrency
4.10. Mining
4.11. DApps
4.12. DAO

Unit 5:   Introduction to Hyperledger Fabric V1   (08L)

5.1. Introduction to Hyperledger
5.2 What is Hyperledger
5.3 Why Hyperledger
5.4 Where can Hyperledger be used
5.5 Hyperledger Architecture
5.6 Membership
5.7 Blockchain
5.8 Transaction
5.9 Chaincode
5.10 Hyperledger Fabric
5.11 Features of Hyperledger

Reference Books:

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).

2. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies

3. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System

4. DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger,"Yellow paper.2014.

5. Nicola Atzei, Massimo Bartoletti, and TizianaCimoli, A survey of attacks on Ethereum smart contracts

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] Learning Objectives:

1. To identify the Scope and essentiality of Data Mining.
2. To Analyze Data, choose relevant Models and Algorithms for respective Applications.
3. To develop research interest towards advances in Data Mining.

B] Learning Outcome:

Student should be able to
1. Students will become acquainted with both the Strengths and Limitations of various Data Mining techniques like Classification, Association Analysis and Cluster Analysis.
2. Understand Data Mining fundamentals, Data Mining Principles

Topic/Contents

Unit 1:   Introduction to Data Mining   (04L)
1.1 What is Data Mining
1.2 What is not Data Mining
1.3 Challenges
1.4 Other Issues

Unit 2:   Data   (06L)
2.1 Types of Data
2.2 Data Quality
2.3 Data Pre-Processing

Unit 3:   Classification   (10L)
3.1 Problem Definition
3.2 General Approach
3.3 Decision Tree Induction
3.4 Rule Based Classifiers
3.5 Nearest Neighbour Classifiers
3.6 Bayesian Classifiers
3.7 Artificial Neural Networks
3.8 Support Vector Machine
3.9 Ensemble Methods
3.10 Model Evaluation

Unit 4:   **Association Analysis**   (10L)
    4.1 Problem Definition
    4.2 Frequent item set Generation
    4.3 Rule Generation
    4.4 Challenges
    4.5 Interestingness Measures
    4.6 Generalization of Association Patterns

Unit 5:   **Cluster Analysis**   (10L)
    5.1 Introduction
    5.2 Similarity and Distance
    5.3 Density
    5.4 Characteristics of Clustering Algorithms
    5.5 Center based Clustering Techniques
    5.6 Hierarchical Clustering
    5.7 Density based Clustering
    5.8 Other Clustering Techniques
    5.9 Scalable Clustering Algorithms
    5.10 Cluster Evaluation

Unit 6:   **Visualization**   (08L)
    6.1 Introduction
    6.2 General Concepts
    6.3 Visualization Techniques

Reference Books:

1. *Introduction to Data Mining* by Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, 2005, ISBN: 0321321367

2. *Data Mining: Concepts and Techniques* by Jiawei Han and Micheline Kamber, 2000, ISBN: 1558604898

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. To introduce Students to the basic Concepts and techniques of Deep Learning.
2. To develop skills of using recent Machine Learning Software for solving Practical problems.

B] Learning Outcome:
   Student should be able to
1. Understand various Techniques of Deep Learning
2. Acquaint with Neural Networks.

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 Alpaydın, 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.