



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Computer Applications

Name of Program: BCA (Big Data Analytics - IBM)

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BCABDA301	Major	Cloud Computing Concepts	3	0	0	3	60	20	20	0	0

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

The goal of this course is to provide students with an understanding of basic concepts of cloud computing, various features along with cloud management, its applications and cloud security.

Course Outcomes: After course completion Students will be able to understand:

1. Concept of cloud computing with broader perspectives like requirement, advantages, characteristics, Cloud Service Model and Deployment Model,
2. Cloud Management, Interoperability, Standards, Scalability and Cloud Virtualization Technology Management.
3. Cloud Information security requirement, services and challenges.

UNIT- I

8 Hrs

Basics of Cloud Computing: Introduction, Historical development, principles and vision, Cloud services requirements, Types of Clouds, Advantages and disadvantages of cloud computing, Characteristics of Cloud Computing, key elements in adopting cloud.

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UNIT-II

8 Hrs

Architecture for Cloud Computing: Cloud Computing Environments, Characteristics of cloud computing as per National Institute of Standard and Technology, Deployment Models and Service Models.

UNIT-III

8 Hrs

Cloud Management: Resiliency, Provisioning, Asset management, Concepts of Map reduce.

Virtualization Technology: Introduction, working process of virtualization and benefits of virtualization. Hardware, Virtualization and Software Virtualization.

UNIT-IV

8 Hrs

Types of Virtualizations- Memory Virtualization, Storage Virtualization, Data and Network Virtualization, Desktop and Application virtualization.

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Technology used for virtualization, Hypervisor Virtualization Software, concept of Virtual LAN(VLAN) and Virtual SAN(VSAN).

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BCABDA301	Major	Cloud Computing Concepts	3	0	0	3	60	20	20	0	0

UNIT-V

8 Hrs

Cloud Security: Introduction of cloud Information security services, Design principles, Secure Cloud Software Requirements, Policy Implementation, and Security Challenges.

Textbooks:

1. Judith S. Hurwitz, Daniel Kirsch” Cloud Computing For Dummies, 2nd Edition, John Wiley and Sons inc., New Jersey, 2000.
2. Hashmi, Tahir, Landreau, Jean-Francois” Cloud Strategy: A Decision-based Approach to cloud migration” GregorHohpe: An architect Elevator Guide,2019-2020.

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3. Kavis, Michael J. "Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS) John Wiley and Sons inc., Hoboken, New Jersey, 2000.
4. Mr. Ray J Rafaels "Cloud Computing: From Beginning to End" Second edition, paperback, 2018.

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BCABDA402	Major	Big Data Technologies(Hadoop)	2	0	2	3	60	20	20	30	20

Legends: L – Lecture; T – Tutorial/Teacher Guided Student Activity; P – Practical; Q/A – Quiz/Assignment/Attendance; MST – Mid Semester Test.

***Teacher Assessment** shall be based on following components: Quiz/Assignment/Project/Participation in class activities, given that no component shall exceed more than 10 marks

Course Education Objectives (CEOs):The objective of this course is to teach students about:

1. To familiarize the students with the need and scope of the subject.
2. Provide an exposure giving a strong foundation to the data analytics practices.
3. Big data computing technologies, Watson studio
4. Understand the challenges posed by distributed applications and how ZooKeeper is designed to Handle.
5. create a basis for the use of advanced investigative and computational methods to convert information to useful knowledge.
6. Develop an understanding of how business analytics is actually performed
7. Develop an understanding of the complete open-source Hadoop ecosystem and its near term future direction
8. Covers foundational techniques and tools required for data science and big data analytics like Hadoop, NoSQLMapReduce, BIGSQL, Watson studio.

Course Outcomes (COs):After the completion of the course the student will be able to:

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1. understanding importance and scope of the subject
2. understand the technological foundations of the Big Data
3. differentiate the structured and unstructured data and different databases to store structured and unstructured data like Mongo DB, HBase etc.
4. store and manipulate the different types of data
5. have a knowledge of HADOOP and Hadoop ecosystem and its uses in Big Data

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BCABDA402	Major	Big Data Technologies(Hadoop)	2	0	2	3	60	20	20	30	20

6. understand and apply the Big Data Analytics
7. Understand the functions and features of HDP.
8. To model and Design Big Data for analytics
9. Understand the MapReduce model v1 and review java code.
10. understand the professional and ethical responsibility
11. to produce the good decision makers who can use empirical approaches, wide range of data analytic techniques to problem solving.

PRE- REQUISITES:

This course requires the familiarity with linear algebra, calculus, matrix operations, probability theory, statistics, programming, Database Management System, Data Mining and Warehousing

Syllabus

Unit I

Big Data: Introduction and basics, Evolution of Data Management, Definition, Importance, Big Data Types, Structured and unstructured Data, Sources of bigstructured data and unstructured data, Architecture of Big Data Management System, Stages of Big Data Management,

Big Data Technology Foundations: Technology Components, virtualization, distributed computing, Cloud and Big Data, Integration of data types into a big data environment.

Unit II

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Big Data and operational Databases: relational, non relational, key-value pair, document, column oriented, graph, spatial databases, MapReduce, Hadoop, Hadoop Foundation and Ecosystem, Appliances and Big Data Warehouse, Big data Implementation, Big Data Applications. roles in building a complete big data, solution to common business problems.

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BCABDA402	Major	Big Data Technologies(Hadoop)	2	0	2	3	60	20	20	30	20

Hadoop and HDFS: need for a big data strategy in terms of parallel reading of large data files and internode network speed in a cluster, Hadoop Distributed File System (HDFS), function of the NameNode and DataNodes in a Hadoop cluster, files are stored and blocks ("splits") are replicated. Hive, Sqoop.

Unit III

Big Data Analytics: Introduction, Basic and Advanced Analytics, Drivers, Pillars of Analytics: descriptive, predictive and prescriptive. Core Components of analytical data architecture, Performance issues, Parallel vs. distributed processing, Shared nothing data architecture and Massive parallel processing, Elastic scalability, Data loading patterns.

Data Analytics lifecycle: Discovery, Data Preparation, Model Planning, Model Building, Communicating results and findings.

Unit IV

Apache Ambari: The purpose of Apache Ambari in the HDP stack, architecture of Ambari and Ambari' relation to other services and components of a Hadoop cluster, components of Ambari and their functions, initiating start and stop services from Ambari Web Console.

Introduction of Hortonworks Data Platform – HDP: functions and features of HDP, the IBM value-add components, basics of IBM Watson Studio, description of the purpose of the value-add components

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Unit V

MapReduce and YARN: MapReduce model v1, the limitations of Hadoop 1 and MapReduce, handling the Mapper class with Java, Reducer class and the program driver needed to access MapReduce, the YARN model, Hadoop 2/YARN versus Hadoop 1

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BCABDA402	Major	Big Data Technologies(Hadoop)	2	0	2	3	60	20	20	30	20

ZooKeeper, Slider, and Knox: The challenges with distributed applications and how ZooKeeper is designed to handle them, ZooKeeper: role within the Apache Hadoop infrastructure, the realm of Big Data

TEXT BOOKS:

1. "Introduction to InfosphereBigInsights", IBM Career Education
2. "Changing Business with Data Insight", IBM Career Education
3. "Big Insights Analytics for Business Analysts", IBM Career Education
4. "Hadoop: The Definitive Guide Paperback – 2015" by Tom White, Shroff Publishers & Distributors Private Limited - Mumbai; Fourth edition (2015).
5. "Big Data and Hadoop" by V. K. Jain, Khanna Publishers; 1 edition (1 June 2015)
6. "Big Data for Dummies" by Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman Wiley, ISBN: 978-1-118-50422-2, 2013
7. "Data Analytics, Models, Algorithms for Intelligent Data Analysis by Thomas A., Springer Vieweg, ISBN 978-3-8348-2589-6, 2013
8. "HadoopFor Dummies", Dirk deRoos, For Dummies, 2014

REFERENCE BOOKS:

1. "Big Data: A Revolution That Will Transform How We Live, Work, and Think" by Kenneth Cukier, Viktor Mayer-Schönberger; Mariner Books; Edition (2014)

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2. “Big Data: Using Smart Big Data, Analytics and Metrics to Make Better” by Bernard Marr; Wiley; Edition 1st (2015)
3. “Mining of Massive Datasets, Chapter 2”, by Ullman, Rajaraman,
4. “MapReduce and Parallel DBMS” by Stonebraker et al.,: Friends or Foes?, Communications of the ACM, January 2010.
5. “MapReduce: A Flexible Data Processing Tool” by Dean and Ghemawat, Communications of the ACM, January 2010.

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BCABDA402	Major	Big Data Technologies(Hadoop)	2	0	2	3	60	20	20	30	20

List of Practical:

1. Installation and configuring Hadoop, configuring HDFS,
2. Installation of Zookeeper, Pig, Sqoop and Hbase
3. Running jobs on Hadoop
4. Working on HDFS
6. Hadoop streaming
7. Creating Mapper function using python.
8. Creating Reducer function using python
9. Python iterator and generators
10. Twitter data sentimental analysis using Flume and Hive
11. Business insights of User usage records of data cards
12. Wiki page ranking with Hadoop
13. Health care Data Management using Apache Hadoop ecosystem

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BCABDA403	Minor	System Analysis and Design Concepts	3	0	0	3	60	20	20	0	0

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Course Educational Objectives (CEOs):

- To introduce established and evolving methodologies for the analysis, design, and development of an information system.

Course Outcomes (Cos):The students should be able to:

- Understand system characteristics, project management, prototyping, and systems

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development life cycle phases.

- analyze a problem and design an appropriate solution using a combination of tools and techniques

UNIT-I

Overview of system analysis and design: Systems concepts, Definition, Characteristics of a system, Elements of a system, Types of Systems: Physical or Abstract System. Open or Closed Systems. Man-Made Information Systems: Categories of Information, Formal Information Systems, Informal Information Systems.

UNIT-II

System Development Life Cycle: Recognition of need, Feasibility study, Analysis, Design, Implementation, Post implementation and Maintenance, Project Termination, Prototyping, Role of the system Analyst: Definition, Skills, Academic and Personal Qualifications.

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BCABDA403	Minor	System Analysis and Design Concepts	3	0	0	3	60	20	20	0	0

UNIT-III

System Analysis: Systems Planning and the Initial Investigation- Initial Investigation: Needs Identification, Strategies for Determining Information Requirements, Problem Definition and Project Initiation.

Structured Analysis: Introduction, Tools of Structured Analysis: Dataflow Diagrams, Data Dictionaries,

Decision Tables, Decision Trees, Structured English.

Feasibility study: Introduction, Feasibility Considerations, Feasibility Study Stages, Feasibility

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Report, Cost/Benefit Analysis.

UNIT-IV

System Design: The Process and Stages of System Design: Introduction, The Process of Design: Logical and Physical Design, Design Methodologies: Structured Design, Form-Driven Methodology- The IPO Charts.

Input/ Output and Forms Design: Introduction, Input Design, Output Design, Forms Design.

File Organization and Data Base Design: Introduction, File Structure, File Organization, Data

Base Design, Views of Data.

UNIT-V

System implementation, Post Implementation and Maintenance: Introduction, Testing objectives, Types of Testing, Quality Assurance: Quality Factors specifications, Levels of Quality Assurance, Post Implementation and Maintenance.

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BCABDA403	Minor	System Analysis and Design Concepts	3	0	0	3	60	20	20	0	0

Text Books:

1. Elias M. Awad, System Analysis and Design, GALGOTIA Publications.
2. Joseph S. Valacich, Joey F. Grogger & Jeffrey A. Hoffer, Essentials of Systems Analysis and Design, 2004.
3. V. Rajaraman, Analysis and Design of Information Systems, III Edition, 2014.

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BCABDA404	Minor	Basics of Computer Networks	3	0	0	3	60	20	20	0	0

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Course Educational Objectives (CEOs):

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- To provide an introduction to the fundamental concepts on data communication and the design of computer networks.
- To get familiarized with the basic protocols of computer networks.

Course Outcomes (COs): After the successful completion of this course students will be able to

- Identify the different components in a Communication System and their respective roles.
- Describe the technical issues related to the local Area Networks
- Identify the common technologies available in establishing LAN infrastructure.

UNIT-I

Introduction: Computer Network, Data communication, Network Topologies, Layered Network Architecture-Review of ISO-OSI Model., Transmission Media: Guided and unguided.

UNIT-II

Data Security and Integrity: Parity Checking Code, Cyclic redundancy checks (CRC), Hemming Code, Flow and error control, Go-Back-N protocol, sliding window protocol. Contention Protocol- Stop-Go-Access Protocol.

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BCABDA404	Minor	Basics of Computer Networks	3	0	0	3	60	20	20	0	0

UNIT-III

Data Link Layer: Simplex, Half duplex and Full duplex, Inter Networking, Layer 1 connections-Repeater, Hubs, Layer 2 connections-Bridges, Switches, Layer 3 connections-Routers, Gateways.

UNIT-IV

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Wide Area Network: Introduction, Network routing, least cost routing algorithms, Dijkstra's algorithm, Internetworking.

UNIT-V

Transport and upper layers in OSI Model: Transport layer functions, Network Security, email, Multimedia.

Text Books:

1. A.S.Tanenbaum, "Computer Network", 4th addition, PHI
2. Forouzan "Data Communication and Networking 3ed", TMH
3. J.F.Hayes, "Moduling and Analysis of Computer Communication Networks", Plenum Press
4. D.E.Comer, "Internetworking with TCP/IP", Volume Ist&IInd, PHI
5. Willium Stalling, "Data & Computer communications", Maxwell Macmillan International Ed.
6. D.Bertsekas and R.Gallager,"Data Networks", 2ndEd. ,PHI.
7. G.E. Keiser,"Local Area Networks ", McGraw Hill, International Ed.

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