

# **BHAKTA KAVI NARSINH MEHTA UNIVERSITY JUNAGADH**

(Gujarat) INDIA



**CURRICULUM FOR  
M. Sc. (IT & CA)**

(Master of Science – Information Technology & Computer Application)

(Semester - 2)

**Effective From NOV- 2018**

**BHAKTA KAVI NARSINH MEHTA UNIVERSITY****Master of Science (Information Technology & Computer Application) – Sem – 2**

[2 Years– Four Semester Full Time Program]

<b>Code</b>	<b>Course</b>	<b>No. Of Lectures/ Lab (Per Week)</b>	<b>Credit</b>
CS-07	APPLICATION DEVELOPMENT USING ADVANCED ANDROID	5	5
CS-08	INTRODUCTION TO BIG DATA AND HADOOP	5	5
CS-09	CLOUD COMPUTING	5	5
CS-10	PRACTICAL – 1 (BASED ON CS-07)	5	5
CS-11	PRACTICAL – 2 (BASEDON CS-08 & CS-09)	5	5
CS-12	PROJECT DEVELOPMENT(In House)	5	5
Total Credits of Semester-2			<b>30</b>

## **CS – 07: APPLICATION DEVELOPMENT USING ADVANCED ANDROID**

### **Objective:**

- To be able to develop mobile applications using advanced android api based on
- Data storage in external and internal memory and database
- To develop app that supports animation, multimedia, camera, sensor
- To develop app that supports Network, Bluetooth-Wi-Fi
- Developing web service and retrieving data using JSON & xml
- Packaging and distributing android app

**Pre-Requisites:** OOPS concepts, Programming in core java, Basic Android Programming.

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## **Unit – 1**

### **Basics of Android & UI Design**

- Core building blocks, Android manifest.xml file, R.java file, Basic UI widgets, Activity, Layout, Internet

### **Working with view and adaptor**

- Adaptors: Array adaptor, Arraylist adaptor
- SimpleCursorAdapter, Base adaptor Views: GridView, ScrollView, WebView, SearchView, TabHost  
DynamicListView, ExpandedListView

### **Multimedia API**

- Audio – Recording audio, Playing audio
  - Video– Recording video, Playing video
  - Alarm Manager
  - Camera-Capturing pictures, configuring camera mode settings, camera parameters, zooming camera
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## **Unit - 2**

### **Data Storage & SQLite**

- Shared Preferences
- Android File System
- Internal storage, External storage
- SQLite : Storing data using SQLite, Querying SQLite database insert-update-delete operations, Persistent database using SQLiteOpenHelper and creating a database

### **Content Provider, Intent & Notifications**

- Accessing built in content providers
  - Searching for content
  - Adding, changing, and removing content
  - Creating content provider
  - Sending & Receiving Broadcast
  - Notifying user, Notifying with status bar
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## **Unit – 3**

### **Device Connectivity**

- Bluetooth Tutorial –existence of Bluetooth, enable Bluetooth discover devices, List Paired Devices, establishing connection between devices
- Working with WiFi

### **Working with Sensor**

- Sensor API
- Working with different sensors :Motion Sensor, Position Sensor, Environmental Sensor Sensor Values, SensorManager class, Sensor Class, SensorEvent class, SensorEventListener interface, Compass Acceslerometer and Orientation Sensors

- Reading sensor data, calibrating sensors, determining device orientation

### **Android Web Service**

- Introduction to web service
  - Soap Vs Restful web service
  - Android Restful web service example with java servlet
  - Storing data into external database
  - Verifying data in android with external database
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## **Unit - 4**

### **Introduction of Retrofit Parsing**

- Introduction of Retrofit
- Android Retrofit Tutorial to Get JSON From Server Using Retrofit Call Perform Insert , Update , Delete using php MySql server

### **WiFi & Bluetooth**

- Monitoring and managing Internet connectivity
  - Managing active connections
  - Managing WiFi networks
  - Controlling local Bluetooth device
  - Discovering and bonding with Bluetooth devices
  - Managing Bluetooth connections
  - Communicating with Bluetooth
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## **Unit - 5**

### **Location Based Services and Google Maps**

- Location Based Services - Finding current location and listening for changes in location, Proximity alerts, Working with Google Maps
- Showing google map in an Activity
- Map Overlays
- Geocoder
- Displaying route on map

### **Drawing Animation and Graphics programing**

- Drawing on screen – using canvas and paint
- Working with bitmap, shapes
- 2D Animation - Drawable, View, Property animation

### **Packaging Deploying and distributing / selling app**

- Signing certificate
- Distributing android app via Google Play
- Obfuscating and optimizing with ProGuard

### **References Books**

- Advanced Android Application Development – Joseph Annuzzi, Lauren darcey Shane Conder – 4th Edition, Addison – Wesley
- Android cookbook - Ian F. Darwin Oreilly
- The Android Developer’s CookBook – Building Application with Android SDK – 2nd Edition, Addison – Wesley

## **CS - 08 : INTRODUCTION TO BIG DATA AND HADOOP**

### **Objective:**

- Master the concepts of HDFS and MapReduce framework
- Understand Hadoop Architecture
- Setup Hadoop Cluster and write Complex MapReduce programs
- Learn data loading techniques using Sqoop and Flume
- Perform data analytics using Pig and Hive
- Implement HBase and MapReduce integration
- Implement Advanced Usage and Indexing
- Implement best practices for Hadoop development
- Work on a real life Project on Big Data Analytics

### **Pre Requisites:**

- Knowledge of Java, SQL and Linux commands is mandatory.

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## **Unit - 1**

### **Introduction to Big data and Hadoop**

- Introduction/Installation of Virtual Box and the Big Data VM Introduction to Linux
- Why Linux?
- Windows and the Linux equivalents
- Different flavors of Linux
- Unity Shell (Ubuntu UI)
- Basic Linux Commands (enough to get started with Hadoop)
- What is Hadoop?
- Core Hadoop Components
- Hadoop Ecosystem (Hbase, Hive, Hcatalog, Pig, Sqoop, Oozie, Mahout, ZooKeeper)

### **Understanding Big Data**

- Understanding Big Data
- 3V (Volume Variety Velocity) characteristics
- Structured and Unstructured Data
- Application and use cases of Big Data
- Limitations of traditional large Scale systems

### **HDFS (The hadoop Distributed File System)**

- HDFS Overview and Architecture
- Deployment Architecture
- Name Node, Data Node and Checkpoint Node (aka Secondary Name Node)
- Safe mode & Configuration files
- HDFS Data Flows (Read vs Write) How HDFS addresses fault tolerance?
- Data replication
- HDFS Interfaces
- Command Line Interface
- File System
- Administrative
- Web Interface
- Advanced HDFS features
- Load Balancer

## NoSQL Database Theory concepts

- NoSQL Concepts
- Review of RDBMS
- Need for NoSQL
- ACID vs BASE
- Schema on Read vs. Schema on Write
- Different types of NoSQL databases
- Key Value
- Columnar
- Document
- Graph
- Columnar Databases concepts

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## Unit - 2

### MapReduce - Theory Concepts

- MapReduce overview
- Functional Programming paradigms
- How to think in a MapReduce way? MapReduce Architecture
- Legacy MR vs Next Generation MapReduce (aka YARN/MRv2)
- Slots vs Containers
- Schedulers
- Shuffling, Sorting
- Hadoop Data Types
- Input and Output Formats
- Input Splits Partitioning (Hash Partitioner vs Customer Partitioner)
- Configuration files
- MR Algorithm and Data Flow
- Word Count
- Alternatives to MR BSP (Bulk Synchronous Parallel)
- Graph Computing Engines

### Higher level Abstraction for MR (pig)

- Introduction and Architecture
- Different Modes of executing Pig constructs
- Data Types, Dynamic invokers ,Pig, streaming, Macros
- Pig Latin language Constructs (LOAD, STORE, DUMP, SPLIT etc)
- User Defined Functions

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## Unit - 3

### MapReduce 2 practical

- Developing, debugging and deploying MR programs
- Standalone mode (in Eclipse)
- Pseudo distributed mode (as in the Big Data VM)
- Fully distributed mode (as in Production) MR API
- Old and the new MR API
- Java Client API
- Saving Binary Data using SequenceFiles and Avro Files

- Hadoop Streaming (developing and debugging non Java MR programs Ruby and Python)
- Optimization techniques
- Compression
- MR algorithms (Nongraph)
- Sorting
- Inverse Document Frequency
- Student Data Base
- Max Temperature
- Different ways of joining data
- MR algorithms (Graph)
- PageRank

### **Higher Level Abstraction for MR(Hive)**

- Introduction and Architecture
- Different Modes of executing Hivequeries
- Meta store Implementations
- HiveQL (DDL & DML Operations) ExternalVS
- Partitions & Buckets
- User Defined Functions
- Transformations using Non Java UseCases
- Comparison of Pig and Hive

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## **Unit - 4**

### **NoSQL Databases 2 Practical**

- HBase Architecture
- Master and the Region Server
- Catalog tables (ROOT and META)
- Major and Minor compaction
- Configuration files
- HBase vs Cassandra
- Interfaces to HBase (for DDL and DML operations)
- Java API
- Client API
- Filters
- REST API
- Advance HBase Features
- HBase Data Modeling
- Bulk loading data in HBase
- HBase Coprocessors Observers (similar to Triggers in RDBMS)
- Bidirectional
- Lazy Collection

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## **Unit - 5**

### **Spark**

- Introduction to RDD
- Installation and Configuration of Spark
- Spark Architecture
- Different interfaces to Spark

## **Setting up a Hadoop Cluster Using Apache Hadoop**

- Cloudera Hadoop cluster on the Amazon Cloud (Practice)
- Using EMR (Elastic Map Reduce)
- Using EC2 (Elastic Compute Cloud) SSH Configuration
- Stand alone mode (Theory) Distributed mode (Theory)
- Pseudo distributed

## **Hadoop and Use Cases**

- Hadoop industry solutions
- Importing/exporting data across RDBMS and HDFS using Sqoop
- Getting real time events into HDFS using Flume
- Creating work flows in Oozie
- Processing data in real time using Storm

## **References Books**

1. MapReduce Design Patterns Building Effective Algorithms and Analytics for Hadoop and Other Systems By Donald Miner, Adam Shook Publisher: O'Reilly Media
2. Professional Hadoop Solutions By Boris Lublinsky, Kevin T. Smith, Alexey Yakubovich
3. Hadoop The Definitive Guide by Tom White
4. Hadoop Operations, Eric Sammer
5. Hadoop for Dummies by Dirk Deroos
6. Programming Pig Dataflow Scripting with Hadoop By Alan Gates
7. Programming Hive Book by Dean Wampler, Edward Capriolo, and Jason Ruthergle.



## **CS - 09: CLOUD COMPUTING**

### **Objective:**

- To describe cloud computing architecture and services
- To identify cloud platforms and services
- To identify design issues of cloud computing
- To analyze the security factors of implementing cloud environment
- To understand the server virtualization and its implementation
- To review real time applications of cloud computing

### **Pre Requisites:**

- Knowledge of Advance Computer Networks is mandatory

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## **Unit - 1**

### **Overview of Computer paradigm**

- Recent trends in Computing:
  - Grid Computing
  - Cluster Computing
  - Distributed Computing
  - Utility Computing
  - Cloud Computing

### **Introduction of Cloud Computing**

- Cloud Architecture
- Cloud Computing (NIST Model):
  - Introduction to Cloud Computing
  - Cloud service providers properties
- Characteristics & Disadvantages:
  - Pros & cons of Cloud computing
  - Cloud Computing vs Cluster Computing vs Grid computing
  - Role of open standards
- Management and Administration of Cloud Services.

### **Cloud computing Architecture**

- Cloud computing stack:
  - Comparison with traditional computing architecture (client/server)
  - Services provided at various levels
  - How Cloud Computing Works
  - Role of Networks in Cloud computing
  - Protocol used
- Role of Web service: Service Models (XaaS):
  - Infrastructure as a Service(IaaS)
  - Platform as a Service(PaaS)
  - Software as a Service(SaaS)
- Deployment Models:
  - Public cloud
  - Private cloud
  - Hybrid cloud
  - Community cloud

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## Unit – 2

### Infrastructure as a Service(IaaS)

- Introduction to IaaS:
  - IaaS definition,
  - Introduction to virtualization,
  - Different approaches to virtualization,
  - Hypervisors
- Virtual Machine(VM): Resource Virtualization:
  - Server
  - Network
  - Virtual Machine(resource) provisioning and manageability
  - storage as a service
  - Data storage in cloud computing(storage as a service)
  - Examples: Amazon EC2, Renting, EC2 Compute Unit, Platform

### Cloud Security

- Infrastructure Security:
  - Network level security
  - Host level security
  - Application level security
- Data security and Storage:
  - Data privacy and security Issues
  - Jurisdictional issues raised by Data location
  - Identity & Access Management
  - Access Control Trust
  - Risk Authentication in cloud computing
  - Commercial and business

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## Unit – 3

### Platform as a Service(PaaS)

- Introduction to PaaS :
  - What is PaaS, Service Oriented Architecture(SOA)
- Cloud Platform and Management:
  - Computation
- Storage Examples:
  - Google App Engine
  - Microsoft

### Software as a Service(SaaS)

- Introduction to SaaS Web services
- Web 2.0
- Web OS
- Case Study on SaaS

### Service Management in Cloud Computing

- Service Level Agreements(SLAs)
- Billing & Accounting

- Comparing Scaling Hardware:
    - Traditional vs. Cloud
  - Economics of scaling:
    - Benefitting enormously
  - Managing Data:
    - Looking at Data
    - Scalability & Cloud Services
    - Database & Data Stores in Cloud
    - Large Scale Data
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## **Unit - 4**

### **Virtualization**

- Virtualization Technology
  - Virtualization objectives
  - Types of virtualization
  - Virtualization implementation
  - Virtual servers introduction
    - Xen server-Hyper V – I
    - Hyper V – II
    - VMWare – I
    - VMWare – II
- 

## **Unit - 5**

### **Case Study on Open Source & Commercial Clouds**

- Eucalyptus
- Microsoft Azure
- Amazon EC2

### **References Books**

1. Kenneth Hess, Amy Newman – Practical Virtualization Solutions – Prentice Hall, 2010
2. Shahed Latif, Tim Mather, Subra Kumaraswamy – Cloud Security and Privacy : An Enterprise perspective on risks and compliance – O'Reilly Media Inc., 2009
3. Gautam Shroff – Enterprise Cloud Computing: Technology, Architecture, Applications – Cambridge University Press, 2010
4. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
5. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg

CS – 10

100 Marks

**PRACTICAL – 1 (Based on CS – 07)**

CS – 07 – Application Development Using Advanced ANDROID

- Each session is of 3 hours for the purpose of practical Examination.
- Practical examination may be arranged before or after theory exam

CS – 11

100 Marks

**PRACTICAL – 2 (Based on CS – 08 & CS – 09)**

CS – 08 – Introduction To Big Data &amp; Hadoop

CS – 09 – Cloud Computing

- Each session is of 3 hours for the purpose of practical Examination.
- Practical examination may be arranged before or after theory exam

CS – 12

100 Marks

**PROJECT DEVELOPMENT (IN HOUSE)**

(Project must be developed in the computer laboratory of concern institute under the supervision of faculties of concern institute on any subject of previous semester or current semester. **(At the time of Project-Viva examination student must show Project Report (in hard copy) along with all the Workouts in workbook, implementation of project in SDLC Documentation, Program codes and project in running mode**

**Note :**

- Project must be submitted before two week of commencement of theory exam.
- Project viva examination may be arranged before or after theory exam.
- During the project viva examination project must be run.

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[2 Years– Four Semester Full Time Program]

**Paper Style**

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**Unit : 01**

Question : 1 (A)	Answer The Following Question	(Only Three)	03
Question : 1 (B)	Answer The Following Question	(Any Two out of Three)	06
Question : 1 (C)	Answer The Following Question	(Any One out of Two)	05

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**Unit : 02**

Question : 2 (A)	Answer The Following Question	(Only Three)	03
Question : 2 (B)	Answer The Following Question	(Any Two out of Three)	06
Question : 2 (C)	Answer The Following Question	(Any One out of Two)	05

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**Unit : 03**

Question : 3 (A)	Answer The Following Question	(Only Three)	03
Question : 3 (B)	Answer The Following Question	(Any Two out of Three)	06
Question : 3 (C)	Answer The Following Question	(Any One out of Two)	05

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**Unit : 04**

Question : 4 (A)	Answer The Following Question	(Only Three)	03
Question : 4 (B)	Answer The Following Question	(Any Two out of Three)	06
Question : 4 (C)	Answer The Following Question	(Any One out of Two)	05

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**Unit : 05**

Question : 5 (A)	Answer The Following Question	(Only Three)	03
Question : 5 (B)	Answer The Following Question	(Any Two out of Three)	06
Question : 5 (C)	Answer The Following Question	(Any One out of Two)	05