

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
MCA (5th Semester)
Database Group

Course: 501: Cloud Computing

Course Code	501
Course Title	Cloud Computing
Credit	4
Teaching per Week	4 Hrs.
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Review / Revision	June 2017
Purpose of Course	The purpose of the course is to make student capable of implementing the concepts, methods and tools of Cloud Computing
Course Objective	The objective of the course is to provide comprehensive and in-depth knowledge of Cloud Computing Concepts, technologies, architecture and applications and implementations.
Pre-requisite	Web Services, DBMS concepts, Networking
Course Outcome	After completion of this course, the students will be capable to work in various cloud environment like Salesforce, Azure, AWS.
Course Content	<p>Unit 1: Introduction</p> <ul style="list-style-type: none"> 1.1 Grid Computing 1.2 Cluster Computing 1.3 Cloud Computing (NIST Model) <ul style="list-style-type: none"> 1.3.1 Evolution 1.3.2 History, Properties, characteristics & Disadvantages <p>Unit 2: Cloud Computing Architecture</p> <ul style="list-style-type: none"> 2.1 Cloud Computing Stack <ul style="list-style-type: none"> 2.1.1 Comparison with traditional architecture 2.2 Service Models Introduction <ul style="list-style-type: none"> 2.2.1 Infrastructure as a Service (IaaS) 2.2.2 Platform as a Service (PaaS) 2.2.3 Software as a Service (SaaS) 2.3 Deployment Models <ul style="list-style-type: none"> 2.3.1 Public Cloud 2.3.2 Private Cloud 2.3.3 Hybrid Cloud 2.3.4 Community Cloud <p>Unit 3: Service Models</p> <ul style="list-style-type: none"> 3.1. Infrastructure as a Service (IaaS) <ul style="list-style-type: none"> 3.1.1 Introduction to Virtualization <ul style="list-style-type: none"> 3.1.1.1 Hypervisors, Machine Image, Virtual Machine 3.1.2 Resource Virtualization <ul style="list-style-type: none"> 3.1.2.1 Server, Storage, Network 3.1.3 Amazon EC 3.1.4 Eucalyptus 3.2. Platform as a Service (PaaS) <ul style="list-style-type: none"> 3.2.1. Introduction to Service Oriented Architecture (SOA) 3.2.2. Cloud Platform

	<p>3.2.2.1. Computation 3.2.2.2. Storage 3.2.3. Microsoft Azure 3.2.4. Salesforce.com's Force.com 3.3. Software as a Service (SaaS) 3.3.1. Web Services 3.3.2. Web OS</p> <p>Unit 4: Cloud Security 4.1 Infrastructure Security 4.2 Data Security and Storage 4.3 Identity & Access Management 4.4 Access Control 4.5 Authentication in Cloud</p> <p>Unit 5: Introduction to Cloud Databases (DbaaS) 5.1 Amazon SimpleDB & RDS 5.2 Azure Table Service & SQL Azure 5.3 BigTable 5.4 Oracle Cloud</p>
Reference Books	<ol style="list-style-type: none"> 1. Cloud Computing Principles and Paradigms by Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley, 2011 2. Cloud Computing : Principles, Systems and Applications by Nikos Antonopoulos, Lee Gillam, Springer 2012 3. Enterprise Cloud Computing : Technology, Architecture, Applications by Gautam Shroff Cambridge University Press 2010 4. Cloud and Virtual Data Storage Networking by Greg Schulz Auerbach, 2011 5. Cloud Security : A Comprehensive Guide to Secure Cloud Computing by Ronald L Krutz, Russel Dean Vines, John Wiley & Sons, 2010 6. Cloud Computing Bible by Barrie Sosinsky, Wiley India, 2011 7. Cloud Computing by David Crookes, TMH Education 2012 8. Cloud Computing : Implementation, Management and Security by James F Ransome, John W Rittinghouse, CRC Press, 2009 9. Amazon Cloud Computing with Java by Aditya Yadav, Lulu.com, 2010 10. Grid and Cloud Database Management by Fiore, SAndro, Aloisio, Giovanni, Springer, 2010 11. Building a Database Cloud for Dummies by Michael Wessler, John Wiley & Sons, 2012
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	<p>30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc.</p> <p>70% assessment is based on semester end University External examination</p>

Course: 501: Internet of Things (IoT) & Embedded Systems

Course Code	501
Course Title	Internet of Things (IoT) & Embedded Systems
Credit	4
Teaching per Week	4 Hrs.
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Review / Revision	June 2017
Purpose of Course	This course is an introduction for students to IoT. The course also gives students an idea about various components of IoT and explains the working of them. The course also explains the role of embedded systems in IoT ecosystem.
Course Objective	The objective of the course is - <ol style="list-style-type: none"> 1. To make students understand IoT 2. To make student understand various component of Micro-Computer and their working 3. To explain various types of Micro-Computer operating system 4. To introduce students with Programming in IoT.
Pre-requisite	C , .NET, Unix
Course Outcome	After studying this Student will be able to understand how Micro-Computer works and importance of various components of a Micro-Computer. This course will also help students to appreciate the role of embedded systems in IoT Environment. After successful completion students will be able to work with different types of Micro-Computers and operating systems for their IoT based application development.
Course Content	<p>Unit 1: Introduction to Embedded Systems</p> <ol style="list-style-type: none"> 1.1 What is a Microcontroller? 1.2 Architecture of Microcontroller <ol style="list-style-type: none"> 1.2.1 ARM 1.2.2 8051 1.3 Introduction to Sensors 1.4 Types of Sensors & their work 1.5 Wireless Sensor Network 1.6 Role of Microcontrollers in IoT <p>Unit 2: Internet of Things (IoT)</p> <ol style="list-style-type: none"> 2.1 Introduction to IoT <ol style="list-style-type: none"> 2.1.1 IoT Today 2.1.2 IoT Vision 2.2 IoT Architecture <ol style="list-style-type: none"> 2.2.1 Elements of IOT Ecosystem 2.2.2 Physical-Entity View and IoT Context View 2.2.3 Requirement process and —other views 2.3 IoT Related Standards and Protocols 2.4 Industrial Applications of IoT 2.5 IoT Privacy, Security & Governance <ol style="list-style-type: none"> 2.5.1 Identification in Distributed Environment 2.5.2 Anonymization of user’s Data in a Distributed and Mobile Environment 2.5.3 Device Authentication 2.5.4 Data Correlation and Information Retrieval 2.5.5 Human IoT Trust Relationship 2.5.6 Risks of Isolation and Confinement 2.6 IoT Botnet

	<p>Unit 3: Micro-Computing Environment</p> <p>3.1 What is a Micro-Computer? 3.2 Micro-Computing Paradigm 3.3 Difference between Microcontroller and Micro-Computer 3.4 Micro-Computer OS 3.4.1 Raspbian OS 3.4.2 Windows IoT 3.4.3 Contiki OS 3.4.4 RIOT 3.5 Use of Micro-Computers in IoT 3.6 Interfacing with Micro-Computer</p> <p>Unit 4: Raspberry Pi : A platform for IoT</p> <p>4.1 Introduction to Pi family 4.2 OS in Pi 4.3 Configuring Pi for IoT 4.4 Interacting Pi with Ports & Sensors</p> <p>Unit 5: IoT Application Development Using .NET</p> <p>5.1 Server side Development 5.2 Client side Development 5.3 Peer to Peer Interaction 5.4 IoT Interaction through Mobile Apps</p>
Reference Books	<ol style="list-style-type: none"> 1) Introduction to Embedded System – By Shibu K V , McGrawHill 2) Microcontrollers – Architecture, Programming, Interfacing and system design – By Raj Kamal , Pearson 3) Exploring C for Microcontrollers : A hands on approach, Springer 4) 8051 Microcontrollers an Application based Introduction, Elsevier 5) Getting Started with Internet of Things – By Cuno Pfister, O’Reilly 6) Learning Internet of Things – By Peter Waher , Packt Publication 7) Internet of Things : A Hands-on Approach – By Arshdip Bahga and Vijay Madiseti 8) Raspberry Pi User Guide – By Eben Upton and Garath Halfacree, Wiley 9) Raspberry Pi for Dummies , Wiley 10) Microprocessor Architecture, Programming and Applications with the 8085 - By Ramesh Gaonkar , Penram International Publishing 11) Raspberry Pi IoT in C – By Harry Fairhead, I/O Press
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 70% assessment is based on semester end University External examination

Course: 502: Artificial Intelligence and Knowledge Based Systems

Course Code	502
Course Title	Artificial Intelligence and Knowledge Based Systems
Credit	4
Teaching per Week	4 Hrs.
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Review / Revision	June 2017
Purpose of Course	The purpose of the course is to make student capable of implementing the concepts, methods and tools of Artificial Intelligence and learn their implementation in Knowledge Based Systems
Course Objective	To acquaint students with concepts of Artificial Intelligence and its applications.
Pre-requisite	Data Structures, Information Systems
Course Outcome	After completion of this course, the students will be capable to use various Artificial Intelligence techniques in various applications.
Course Content	<p>Unit 1: Introduction to Artificial Intelligence</p> <ol style="list-style-type: none"> 1.1. What is AI 1.2. Applications of AI 1.3. Introduction to Expert System 1.4. Applications of expert systems <p>Unit 2: Knowledge Overview</p> <ol style="list-style-type: none"> 2.1. Definition and importance of knowledge 2.2. Overview knowledge representation 2.3. Overview of knowledge organization 2.4. Overview of knowledge Manipulation 2.5. Overview of Knowledge Acquisition <p>Unit 3: Representation and Search</p> <ol style="list-style-type: none"> 3.1. Structured Knowledge <ol style="list-style-type: none"> 3.1.1. Associative networks 3.1.2. Frame structures 3.1.3. Conceptual dependencies and scripts 3.2. Object oriented representation <p>Unit 4: Organization and Manipulation, Knowledge Acquisition</p> <ol style="list-style-type: none"> 4.1. Introduction to organization 4.2. Search techniques <ol style="list-style-type: none"> 4.2.1. Uninformed search 4.2.2. Informed search 4.3. Introduction to matching Techniques 4.3 Knowledge Acquisition <ol style="list-style-type: none"> 4.3.1. Knowledge learning types 4.3.2. General learning models 4.3.3. Performance of learning models <p>Unit 5: Expert System</p> <ol style="list-style-type: none"> 5.1. Advantages of Expert Systems 5.2. Characteristics of Expert Systems 5.3. Design of Expert Systems <ol style="list-style-type: none"> 5.3.1. Selecting Problem 5.3.2. Stages in Expert systems development 5.3.3. Errors in developments

	<p>5.3.4. Expert System Software Engineering</p> <p>5.3.5. Expert System Life Cycle</p>
Reference Books	<ol style="list-style-type: none"> 1. Introduction to Artificial Intelligence and Expert System by Dan W. Patterson, PHI (1999) 2. Artificial Intelligence – A Modern Approach (2nd Edition 2004) by Stuart J. Russell and Peter Norvig, Pearson Education 3. Artificial Intelligence - Structures and Strategies for Complex Problem Solving (4th Edition 2004) by George F. Luger, Pearson Education 4. Foundation of Artificial Intelligence and Expert Systems by V.S. Janakiraman, K. Sarukesi, P. Gopalakrishnan, Mc Millan (2002) 5. Expert Systems Principles and Programming (3rd Edition) by Giarratano & Riley, Thomson (Vikas Pulishing House) 6. Introduction to Artificial Intelligence by Rajendra Akerkar, PHI
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	<p>30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc.</p> <p>70% assessment is based on semester end University External examination</p>

Course: 503: ERP Using SAP

Course Code	503
Course Title	ERP Using SAP
Credit	4
Teaching per Week	4 Hrs.
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2017
Purpose of Course	This course imparts fundamental as well as detailed Enterprise Resource Planning using SAP technology platform.
Course Objective	Learn ERP applications and its programming
Pre-requisite	Fundamentals of ERP, DBMS
Course Outcome	After studying this students will be able to understand how to work with ERP modules. After successful completion, students will be able to develop ERP application using SAP.
Course Content	<p>Unit 1: Introduction</p> <ul style="list-style-type: none"> 1.1 Introduction to ERP 1.2 Introduction to SAP 1.3 Example: How SAP works in an Organization <p>Unit 2: Architecture of SAP Application Server</p> <ul style="list-style-type: none"> 2.1 3-Tier Architecture 2.2 Application Servers 2.3 Work processes and its Type <p>Unit 3: Data Dictionary & Data Structures in ABAP</p> <ul style="list-style-type: none"> 3.1 Introduction to Data dictionary 3.2 Different Types of Data structures 3.3 Internal Tables and its operation <p>Unit 4: Modularization Techniques</p> <ul style="list-style-type: none"> 4.1 Include Programs 4.2 Subroutines 4.3 Function Module. 4.4 Types of Function Module(Simple, RFC enabled, BAPI) <p>Unit 5: List Report, ALV Report</p> <ul style="list-style-type: none"> 5.1 Simple List Report 5.2 Interactive List Report 5.3 Events in List Reports 5.4 Field catalog generation in ALV 5.5 Operation on ALV(Sorting, Filtering, Totals, Subtotals, Download, Hide Columns) <p>Unit 6: Module pool programming / Screen Programming</p> <ul style="list-style-type: none"> 6.1 Screen Elements(Simple & Complex) 6.2 Screen Events(PBO/PAI) 6.3 Transactions <p>Unit 7: Selection-Screen programming</p> <ul style="list-style-type: none"> 7.1 Defining Selection Screen. 7.2 User Actions on Selection Screen. 7.3 Events of Selection Screen

	<p>Unit 8: Smartform/Sapscript</p> <p>8.1 Form printing with smartform 8.2 Form printing with Sapscript</p> <p>Unit 9: BDC & LSMW</p> <p>9.1 Data upload through BDC 9.2 Data upload through LSMW</p> <p>Unit 10: Enhancement(Exits & BADI)</p> <p>10.1 What is Enhancement 10.2 User-Exits 10.3 BADI(Business Add-in)</p>
Reference Books	<ol style="list-style-type: none"> 1. ABAP Cookbook by James Wood 2. BC - ABAP Programming from SAP-AG 3. Teach Yourself ABAP/4 in 21 Days by Ken Greenwood, SAMS 4. SAP Smart Forms by Christoph Wachter, Werner Hertleif 5. SAPscript by Michaelson Buchanan 6. Developing Sap's R/3 Application with Abap/4 7. Data Migration Made Easy - R/3 Simplications Group, SAP Labs 8. ABAP Development for SAP NetWeaver BW: Exits, BAdIs, and Enhancements by Dirk Herzog 9. Next Generation ABAP Development (2nd Edition) by Rich Heilman and Thomas Jung
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	<p>30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc.</p> <p>70% assessment is based on semester end University External examination</p>

Course: 503: NoSQL Databases

Course Code	503
Course Title	NoSQL Databases
Credit	4
Teaching per Week	4
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2017
Purpose of Course	To teach the emerging trends in NoSQL databases
Course Objective	To impart knowledge of NoSQL Databases
Pre-requisite	Fundamentals of DBMS
Course Outcome	Students will be able to learn NoSQL databases – namely MongoDB and Cassandra
Course Content	<p>Unit 1: Introduction</p> <ul style="list-style-type: none"> 1.1 History 1.2 Concepts and Characteristics of NoSQL databases 1.3 Primary benefits of NoSQL databases <p>Unit 2: MongoDB</p> <ul style="list-style-type: none"> 2.1 SQL/NoSQL landscape 2.2 Document Vs. Other types of Storage 2.3 MongoDB feature set 2.4 Introduction to BSON and JSON 2.5 MongoDB Architecture 2.6 Documents and Collections <ul style="list-style-type: none"> 2.6.1 Creating Documents 2.6.2 Managing Documents in collections 2.6.3 Iterating over Documents 2.7 Queries <ul style="list-style-type: none"> 2.7.1 Simple Queries 2.7.2 Complex Queries <ul style="list-style-type: none"> 2.7.2.1 Existential field values 2.7.2.2 Aggregations and groups 2.7.2.3 Aggregations and groups in hierarchical data 2.8 Updates and Deletes 2.9 Updates and Arrays 2.10 Indexing 2.11 MongoDB RESTful API 2.12 MongoDB Security 2.13 MongoDB Replication and Sharing 2.14 Introduction to MapReduce <p>Unit 3: Cassandra</p> <ul style="list-style-type: none"> 3.1 Cassandra Architecture <ul style="list-style-type: none"> 3.1.1 Cassandra P2P Architecture 3.1.2 Clustering Structures- Nodes 3.1.3 Rings 3.1.4 Virtual Nodes 3.1.5 Consistency & Hashing 3.1.6 Gossip Protocol 3.1.7 Data Replication 3.1.8 Replication Factors & Indexes 3.1.9 Tunable Consistency 3.1.10 High & Rapid Scalability Memtables, SStables & Commitlogs

	<p>3.1.11 Repairs</p> <p>3.1.12 Tombstones</p> <p>3.1.13 Repairs</p> <p>3.1.14 Replication Factors</p> <p>3.1.15 Compaction and Anti-Entropy</p> <p>3.1.16 Bloom Filters</p> <p>3.2 Data Modelling in Cassandra</p> <p>3.3 Cassandra Administration</p> <p>3.4 CQL3</p> <p>3.5 Integration with Hadoop</p>
Reference Books	<ol style="list-style-type: none"> 1. Chodorow, K. (2013). MongoDB: The Definitive Guide (2nd ed.). Upper Saddle River, NJ: Pearson Education, Inc. ISBN-13: 978-1449344689 ISBN-10: 1449344682. 2. Shashank Tiwari, Professional NoSQL, Sierra Nevada Books, ISBN-13: 978-0470942246 3. Amol Nayak, Instant MongoDB, Packt Publishing Limited, 2013, ISBN-13: 978-1782169703 4. Kristina Chodorow, MongoDB Definitive Guide 2e, O'Reilly, 2013, ISBN-13: 978-1449344689 5. Eben Hewitt, Cassandra Definitive Guide, O'Reilly, 2010, ISBN:ISBN 10:1-4493-9041-2
Teaching Methodology	Classroom, seminar and assignment
Evaluation Method	<p>30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc.</p> <p>70% assessment is based on semester end University External examination</p>

Course: 504: **Advanced Database Administration**

Course Code	504
Course Title	Advanced Database Administration
Credit	4
Teaching per Week	4 Hrs.
Minimum weeks/ Semester	15 (Including Class work, examination, preparation, holidays etc.)
Review / Revision	June 2017
Purpose of Course	Understanding advanced database administration
Course Objective	To learn advanced database administration, database tuning and maintenance
Pre-requisite	RDBMS
Course Out come	After studying the course, students will be able to perform Database Administration
Course Content	<p>Unit 1. Oracle10g Instance creation and management</p> <ol style="list-style-type: none"> 1.1 Oracle Instance 1.2 Installing Oracle 1.3 Oracle Optimal Flexible Architecture (OFA) 1.4 Locating initialization, listener.ora & sqlnet.ora files 1.5 Finding the alert log 1.6 Common environment variables 1.7 Structures in an Oracle Instance 1.8 Oracle Memory Structures, SGA and PGA 1.9 Oracle Processes and their purposes 1.10 Startup, nomount, mount and open database commands <p>Unit 2. Oracle10g Database Architecture</p> <ol style="list-style-type: none"> 2.1 Oracle10g management framework 2.1 Using the Database Creation Assistant (DBA) 2.3 Creating and dropping a database 2.4 Tablespaces 2.5 Tables and Indexes 2.6 Clusters 2.7 Partitioning of Tables and Indexes 2.8 Gathering and applying patches <p>Unit 3. Concurrency Management</p> <ol style="list-style-type: none"> 3.1 Transactions, serialization, locks and latches 3.2 Lock modes 3.3 Detecting and resolving lock conflicts 3.4 Managing deadlocks <p>Unit 4. Interfacing with Oracle</p> <ol style="list-style-type: none"> 4.1 Oracle transaction management 4.2 Using SQL*Plus and iSQL*Plus 4.3 Using embedded Oracle with Pro*C & Java 4.4 PL/SQL & Triggers 4.5 Pining PL/SQL packages & compiling PL/SQL 4.6 System-level triggers – startup trigger, logon trigger, PL/SQL error trigger <p>Unit 5. Oracle*Net</p> <ol style="list-style-type: none"> 5.1 Basic Network structure 5.2 Oracle*Net Files 5.3 Multi-threaded server 5.4 Create additional listeners

- 5.5 Create Oracle Net service aliases
- 5.6 Configure connect time failover
- 5.7 Oracle*Net names resolution

Unit 6. Tablespace Management Overview

- 6.1 Dictionary Managed Tablespaces
- 6.2 Locally Managed Tablespaces
- 6.3 Automatic Segment Space Management
- 6.4 Moving tablespaces online and offline

Unit 7. UNDO Tablespace Management

- 7.1 Use of undo segments
- 7.2 Creating an undo tablespace
- 7.3 User managed undo tablespaces
- 7.4 Automatic undo management
- 7.5 Monitor & Configure undo retention
- 7.6 Use the Undo Advisor
- 7.7 Size the undo tablespace

Unit 8. Oracle Utilities

- 8.1 Datapump - Import/export
- 8.2 SQL*Loader
- 8.3 Oracle Streams
- 8.4 Automatic Database Diagnostic Monitor
- 8.5 Automatic Tuning Optimizer
- 8.6 Automatic Shared Memory Tuning

Unit 9. Oracle Performance Tuning

- 9.1 Locate invalid and unusable objects
- 9.2 Gather SQL optimizer statistics with dbms_stats
- 9.3 Basic Oracle performance metrics
- 9.4 Use OEM and dbms_alert to set warning and critical alert thresholds
- 9.5 The SQL Tuning Advisor
- 9.6 The SQL Access Advisor
- 9.6 Interpreting server generated alerts
- 9.7 Oracle advisory utilities v\$db_cache_advice, v\$shared pool_advice, v\$pga_aggregate_target_advice
- 9.8 Using OEM performance screens
- 9.9 Fixing performance issues

Unit 10. User Management

- 10.1 Creating Users
- 10.2 Altering users
- 10.3 User Profiles
- 10.4 User resource groups
- 10.5 Granting privileges & roles
- 10.6 Auditing user activity with dbms_audit

Unit 11. Oracle Security

- 11.1 Password use in Oracle, Password encryption and password aging, External authentication, Using Single sign-on (SSO)
- 11.2 Object security
- 11.3 Virtual Private Databases (VPD) in Oracle
- 11.4 Oracle "grant execute" security
- 11.5 Use of Roles in Oracle
- 11.6 Register for security updates

	<p>Unit 12. Backup & Recovery</p> <p>12.1 Oracle backup & recovery planning</p> <p>12.2 Parallel instance recovery</p> <p>12.3 Basics of checkpoints, redo log files, and archived log files</p> <p>12.4 Using ARCHIVELOG mode</p> <p>12.5 Creating consistent Oracle backups</p> <p>12.6 Online hot backups</p> <p>12.7 Incremental Oracle backups</p> <p>12.8 Automating database backups with dbms_scheduler</p> <p>12.9 Monitor the flash recovery area</p> <p>12.10 Recovering from loss of a Control file</p> <p>12.11 Recovering from loss of a Redo log file</p> <p>12.12 Recovering from loss of a system-critical data file</p> <p>12.13 Recovering from loss of a non system-critical data file</p>
Reference Books	<ol style="list-style-type: none"> 1. Essentials : Oracle Database 10g by Rick Greenwald, Robert Stackowiak, Jonathan Stern, O'Reilly 2. Oracle High Performance Tuning for 9i and 10g by Gavin Powell, Digital Press 3. Oracle Database 10g, DBA Handbook by Loney, Kevin, Bryla, Bob, Oracle Press 4. Oracle Database 10g - The Complete Reference by Loney, Kevin, Oracle Press 5. Oracle Database 10g: A Beginner's Guide by Micheal Abbey, Ian Abramson Osborne, Oracle Press Series
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	<p>30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc.</p> <p>70% assessment is based on semester end University External examination</p>

Course: 505: **Data Warehousing & Data Mining**

Course Code	505
Course Title	Data Warehousing & Data Mining
Credit	4
Teaching per Week	4 Hrs.
Minimum weeks/ Semester	15 (Including Class work, examination, preparation, holidays etc.)
Review / Revision	June 2017
Purpose of Course	Understanding Data Warehousing and Data Mining
Course Objective	To understand data warehousing and data mining - concepts and methods, and apply them in practice
Pre-requisite	RDBMS, Basics of statistics
Course Outcome	After studying the course, students will learn data warehousing and data mining and its effective use in various applications
Course Content	<p>Unit 1: Data warehouse: Introduction</p> <ol style="list-style-type: none"> 1.1 Data Warehouse characteristics 1.2 Data Marts 1.3 OLTP and OLAP systems 1.4 Star, Snowflakes, and Fact Constellations Schemas for Multi-dimensional Databases 1.5 OLAP Operations in the Multidimensional data model 1.6 Type of OLAP servers <p>Unit 2: Developing Data Warehouse</p> <ol style="list-style-type: none"> 2.1 Building a Data Warehouse 2.2 Three-Tier Data Warehouse Architecture 2.3 Metadata Repository <p>Unit 3: Data Pre-processing</p> <ol style="list-style-type: none"> 3.1 Descriptive Data Summarization: central tendency, dispersion of data 3.2 Data Cleaning : missing values, noisy data 3.3 Data Integration & Transformation 3.4 Data Reduction: Attribute selection 3.5 Data Discretization & Concept Hierarchy Generation <p>Unit 4: Data Mining: Introduction</p> <ol style="list-style-type: none"> 4.1 Knowledge discovery and Data Mining. 4.2 Basic Introduction to Data Mining Functionalities: <ol style="list-style-type: none"> 4.2.1 Concept/Class Description Characterization & Discrimination 4.2.2 Mining Frequent Patterns, Associations, and Correlations 4.2.3 Classification & Prediction 4.3.4 Cluster Analysis 4.2.5 Outlier Analysis 4.2.6 Evolution analysis <p>Unit 5: Mining Frequent Patterns, Associations, and Correlations</p> <ol style="list-style-type: none"> 5.1 Basic concepts: Frequent Itemsets & Closed Itemsets, Association Rules 5.2 The Apriori algorithm: Finding Frequent Itemsets Using Candidate Generation 5.3 FP-growth: Finding Frequent Itemsets without Candidate Generation 5.4 Generating Association Rules from Frequent Itemsets 5.5 Introduction to multilevel and multidimensional Association rules

	<p>Unit 6: Classification & Prediction</p> <ul style="list-style-type: none"> 6.1 Introduction to Classification & Prediction? 6.2 Prediction: Linear Regression, Nonlinear Regression 6.3 Decision Tree Algorithm <ul style="list-style-type: none"> 6.3.1 Decision Tree Induction 6.3.2 Attribute Selection Measures- Information Gain and Gain Ratio 6.3.3 Tree Pruning 6.4 Bayesian Classification <ul style="list-style-type: none"> 6.4.1 Bayes' Theorem 6.4.2 Naïve Bayesian Classification 6.5 Accuracy and Error Measures for classification <p>Unit 7: Cluster Analysis</p> <ul style="list-style-type: none"> 7.1 Classification vs. clustering 7.2 What is Partitioning & Hierarchical Clustering Methods 7.3 Classical Partitioning Methods: k-Means <p>Unit 8: Application and Trends in Data Mining</p>
Reference Books	<ol style="list-style-type: none"> 1. Data Mining: Concepts & Techniques by Han & Kamber , Morgan Kaufmann Publishers 2. Introduction to Data Mining with Case Studies by G. K. Gupta, PHI 3. Data Mining Introductory and Advanced Topics by Dunha, Pearson 4. Data Warehouse Toolkit by R. Kinball, John Wiley & Sons 5. Data Warehouses and OLAP: Concepts, Architectures, and Solutions by Robert Wrembel, Christian Koncilia I, GI 6. Data Mining Techniques: For Marketing, Sales, and Customer Relationship Management by Gordon S. Linoff, Michael J. A. Berry, Wiley 7. Data Preparation for Data Mining by Dorian Pyle, Morgan Kaufmann Publishers 8. Data Warehousing Fundamentals: A Comprehensive Guide for IT Professionals by Paulraj Ponniah, Wiley 9. Data Warehousing: Concepts, Techniques, Products and Applications by C.S.R. Prabhu, PHI Learning 10. Advanced Data Mining Techniques by David Louis Olson, Dursun Delen, Springer
Teaching Methodology	Class work, Discussion, Self-study, Seminars and/or Assignment
Evaluation Method	<p>30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc.</p> <p>70% assessment is based on semester end University External examination</p>

Course: 505: **Big Data**

Course Code	505
Course Title	Big Data
Credit	4
Teaching per Week	4 Hrs.
Minimum weeks/ Semester	15 (Including Class work, examination, preparation, holidays etc.)
Review / Revision	June 2017
Purpose of Course	Understanding distributed computing, Big Data and Hadoop
Course Objective	To learn Big Bata and Hadoop
Pre-requisite	RDBMS
Course Out come	After studying the course, students will have understanding distributed computing and will have hands-on experience on Hadoop
Course Content	<p>Unit 1: Introduction</p> <ul style="list-style-type: none"> 1.1 Evolution of Big Data 1.2 Structuring Big Data 1.3 Elements of Big Data(V's) 1.4 Big Data Analytics 1.5 Commercial use of Big Data <p>Unit 2: Big Data Technology</p> <ul style="list-style-type: none"> 2.1 Distributed and Parallel Computing 2.2 Introducing Hadoop 2.3 HDFS and MapReduce 2.4 Cloud Computing and Big Data 2.5 In-Memory Computing <p>Unit 3: Hadoop</p> <ul style="list-style-type: none"> 3.1 HDFS Architecture 3.2 Blocks 3.3 Name Nodes and Data Nodes 3.4 Using HDFS Files 3.5 Hadoop Specific File System Types 3.6 HDFS Commands 3.7 org.apache.hadoop.io package 3.8 MapReduce Architecture 3.9 Hadoop YARN 3.10 HBase 3.11 Combining HBase 3.12 Hive 3.13 Pig and Pig Latin 3.14 Sqoop <p>Unit 4: Technology Foundations</p> <ul style="list-style-type: none"> 4.1 Big Data Stack 4.2 Virtualization and Big Data <p>Unit 5: Storing Data in Databases and Processing of Data</p> <ul style="list-style-type: none"> 5.1 RDBMS and Big Data <ul style="list-style-type: none"> 5.1.1 CAP Theorem 5.3 NoSQL Databases 5.4 Polygot Persistence 5.5 Integrating Big Data with traditional Data Warehouses

	<p>5.6 Big Data Analytics</p> <p>5.7 Processing Data with MapReduce</p> <p>5.8 Customizing MapReduce Execution and implementing MapReduce Program</p> <p>5.9 Testing and Debugging MapReduce Applications</p> <p>5.10 Analytical Approaches and Tools to Analyze Data</p>
Reference Books	<ol style="list-style-type: none"> 1. D T Editorial services, Big Data Black book, Dreamtech Press, ISBN 978-93-5119-931 2. Alex Holmes, Hadoop in Practice, Manning Publication company, 2014, ISBN 1617292222, 9781617292224 3. Kuan-Ching, Li Hai Jiang, Laurence T. Yang Alfredo Cuzzocrea, Big Data : Algorithms, Analytics and Applications. CRC Press 4. Hu, Wen Chen, Big Data Management, Technologies and Applications, IGI Global 5. Tom White, Hadoop The Definitive Guide, o'Reilly
Teaching Methodology	Class work, Discussion, Self Study, Seminars and/or Assignment
Evaluation Method	<p>30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc.</p> <p>70% assessment is based on semester end University External examination</p>

Course: 506: Programming Skills XI

Course Code	506
Course Title	Programming Skills XI
Credit	2
Teaching per Week	2 Hrs.
Minimum weeks/ Semester	15 (Including Lab. work, examination, preparation, holidays etc.)
Review / Revision	June 2017
Purpose of Course	This course helps students to implement the Cloud Computing/IOT practically.
Course Objective	Learning to implement fundamentals and advanced topics of Cloud Computing/IOT practically
Pre-requisite	Practical programming in desktop environment / Embedded Technology
Course Outcome	After studying the course, students will be able to practically work on advanced technology platforms of Cloud Computing/IOT.
Course Content	Practical based on paper no 501. Separate journal to be prepared for this subject 501.
Reference Books	-----
Teaching Methodology	Lab work, Practical Programming Exercises (to be documented in a separate journal), Self-study, and/or Assignment
Evaluation Method	30% Internal assessment is based on Lab attendance, practical test, practical internal examination etc. 70% assessment is based on semester end University External practical examination

Course: 507: Programming Skills XII

Course Code	507
Course Title	Programming Skills XII
Credit	2
Teaching per Week	2 Hrs.
Minimum weeks/ Semester	15 (Including Lab. work, examination, preparation, holidays etc.)
Review / Revision	June 2017
Purpose of Course	This course helps students to implement the concepts of SAP/NoSQL practically
Course Objective	Learning to implement the ERP using SAP/NoSQL databases practically
Pre-requisite	DBMS
Course Outcome	After studying the course, students will be able to practically work on SAP/NoSQL Databases
Course Content	Practical based on paper no 503. Separate journal to be prepared for this subject 503.
Reference Books	-----
Teaching Methodology	Lab work, Practical Programming Exercises (to be documented in a separate journal), Self-study, and/or Assignment
Evaluation Method	30% Internal assessment is based on Lab attendance, practical test, practical internal examination etc. 70% assessment is based on semester end University External practical examination

Course: 508: Programming Skills XIII

Course Code	508
Course Title	Programming Skills XIII
Credit	3
Teaching per Week	3 Hrs.
Minimum weeks/ Semester	15 (Including Lab. work, examination, preparation, holidays etc.)
Review / Revision	June 2017
Purpose of Course	This course helps students to handle advanced database administration activities
Course Objective	Advanced database administration
Pre-requisite	Practically learning advanced database administration
Course Outcome	After studying the course, students will be able to handle database administration, tuning and maintenance in various fields
Course Content	Practical based on paper no 504. Separate journal to be prepared for this subject 504.
Reference Books	-----
Teaching Methodology	Lab work, Practical Programming Exercises (to be documented in a separate journal), Self-study, and/or Assignment
Evaluation Method	30% Internal assessment is based on Lab attendance, practical test, practical internal examination etc. 70% assessment is based on semester end University External practical examination

Course: 509: Programming Skills XIV

Course Code	509
Course Title	Programming Skills XIV
Credit	3
Teaching per Week	3 Hrs.
Minimum weeks/ Semester	15 (Including Lab. work, examination, preparation, holidays etc.)
Review / Revision	June 2017
Purpose of Course	This course helps students to implement Data warehousing & data mining / Big Data practically.
Course Objective	Learn to use Data warehousing and data mining techniques in various practical environments / use Big data practically.
Pre-requisite	Databases, SQL, Advanced SQL
Course Outcome	After studying the course, students will be able to understand Data warehousing and data mining/Big Data practically
Course Content	Practical based on paper no 505. Separate journal to be prepared for this subject 505.
Reference Books	-----
Teaching Methodology	Lab work, Practical Programming Exercises (to be documented in a separate journal), Self-study, and/or Assignment
Evaluation Method	30% Internal assessment is based on Lab attendance, practical test, practical internal examination etc. 70% assessment is based on semester end University External practical examination