Krantiguru Shyamji Krishna Verma Kachchh University, Bhuj
Master of Science (Computer Applications & Information Technology)
Semester: IX

Paper Code: CCCS936		**Total Credit :** 4
Title of Paper: Data Science		**Total Marks :** 70 **Time :** 3 Hrs
Unit	**Description**	**Weighting**
I	**An Introduction to Big Data** Challenges, Managing varieties of Data, The Emerging Big Data Stack, Gartner hype cycle for Big Data emerging technologies, Big Data life Cycle, Types of Data (Unstructured, Structured, semi-structured) Opportunities in Big Data. Introduction to NoSQL: Difference between RDBMS and NoSQL, CAP Theorem for NoSQL, Features / Advantages of NoSQL, Types of NoSQL (Document, Key-Value, Columnar, Graph)	**20%**
II	**Apache Hadoop** Introduction, Hadoop eco-System, High Level Architecture: Component Level Architecture: MapReduce with Yarn, HDFS/ HDFS2, introduction to Yarn, Features of Yarn , Intro to Tez, Features of Tez, Introduction and Features : Pig, Hive, Hbase. Distributed publish – subscribe Messaging: Apache Kafka Distributed MapReduce: Introduction to Apache Spark	**20%**
III	**Hadoop Distributed File System** HDFS Architecture, HDFS Read / Writes processes, HDFS Performance tuning: Overview of HDFS Access, API's & Applications. HDFS Commands, Native Java APIs, Rest APIs.	**20%**
IV	**An Introduction to MapReduce** Introduction to Map-Reduce, Map-Reduce Hands-on with Hadoop streaming. Introduction to Hbase, Hbase vs HDFS, Features/Adv. Of Hbase, Hbase Data Model best practices. [Hands-on]: setup single node Hbase cluster on Ubuntu, configuration setup. Introduction to Hive, how Hive works? Component level architecture: Hive, Hive Commands, Hive Query Language.	**20%**
V	**Distributed MapReduce Computing with Apache Spark** An introduction to Apache Spark, features / advantages of Spark, component level architecture, Resilient Distributed Datasets (RDDs), Parallelized Collections, External Datasets, RDD Operations, Passing functions to Spark, Understanding closures, Printing elements of an RDD, Working with Key-Value Pairs, Transformations, Actions, Shuffle operations, RDD Persistence, Removing Data, Shared Variables, Broadcast Variables, Accumulators. Map-Reduce on file / streaming with spark, Machine Learning with Spark Mlib – Clustering, Regression, Recommender, Graph Analytics: Introduction to Graphx, Features of Graphx, Basic path analytics algorithm with Graphx, Implement Dijkstra Algorithm with GraphX. Data Visulization: An Introduction to Data Viz., Various BI tools, Data Visualization with Tableau.	**20%**
Basic Text & Reference Books :-		
1.	Hadoop: The Definitive Guide, 3rd Edition By Tom White, O'Reilly	
2.	Learning Spark: Lightning-Fast Big Data Analysis by Andy Konwinski, Holden Karau, and Patrick Wendell, O'Reilly	

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Title of Paper: Data Science			
Unit	**Description**		**Total Marks**
I	Q.1 (A) Answer the Following. (Definitions, Blanks, Full Forms, True/False, Match the Following)	06	14
	Q.1 (B) Medium / Long Questions. (With Internal Option)	08	
II	Q.2 (A) Answer the Following. (Definitions, Blanks, Full Forms, True/False, Match the Following)	06	14
	Q.2 (B) Medium / Long Questions. (With Internal Option)	08	
III	Q.3 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.3 (B) Medium / Long Questions. (With Internal Option)	08	
IV	Q.4 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.4 (B) Medium / Long Questions. (With Internal Option)	08	
V	Q.5 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.5 (B) Medium / Long Questions. (With Internal Option)	08	

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Paper Code: CCCS937		**Total Credit :** 4
Title of Paper: Advanced Networking		**Total Marks :** 70 **Time :** 3 Hrs
Unit	**Description**	**Weighting**
I	**The Network Layer** Routing Algorithms, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Congestion Control Algorithms, IP addresses and Classes, Subnets and Subnet masks. IPv4 v/s. IPv6, Introduction to wire shark & packet analysis.	**20%**
II	**The Transport Layer** Quality Of Service, Transport Service Primitives, MAC protocols, CSMA/CD, Establishment of Connection, Releasing of Connection, Flow Control and Buffering, Multiplexing, UDP Protocols, Real-time Transport Protocol[RTP].	**20%**
III	Introduction to virtual machine & configure with real-time machine, Installation of windows server 2012 & Red hat linux server , Configure firewall , Antivirus ,Generate & authenticate open VPN certificate & RSA key	**20%**
IV	Introduction to Cisco Packet Tracer[CPT],Establish own network using CPT, Introduction to software reversing with ollydbg[debugger] & reflector[dotnet]	**20%**
V	Troubleshooting: PC, Router, Switch, Data Recovery from crash hard disk, bad sector repair, hard disk data recovery, real-time network administration	**20%**
Basic Text & Reference Books :-		
1.	Computer Networks 4th Edition - Andrew Tanenbaum	
2.	Computer Networking: A Top-Down Approach Featuring the Internet By James F.Kurose , Keith W.Ross	
3.	Data Communication & Networking 4th Edition By Behrouz A.Forouzan	

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Paper Code: CCCS937			**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Advanced Networking			
Unit	**Description**		**Total Marks**
I	Q.1 (A) Answer the Following. (Definitions, Blanks, Full Forms, True/False, Match the Following)	06	14
	Q.1 (B) Medium / Long Questions. (With Internal Option)	08	
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	Q.2 (B) Medium / Long Questions. (With Internal Option)	08	
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	Q.4 (B) Medium / Long Questions. (With Internal Option)	08	
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Paper Code: CCCS938	**Total Credit :** 4
Title of Paper: Practical Based on CCCS936	**Total Marks :** 70 **Time :** 3 Hrs
Description	

1. Setup & configure the Single node Hadoop Cluster on Ubuntu Machine. [Write scripts for starting and shutting down the clusters]

2. Run Java MapReduce Jobs on Single node cluster, store data on HDFS. [Read flat file and do MapReduce]

3. Setup & Configure Hive, HBase, Pig.

4. Run MapReduce Jobs using Hive Query Language.

5. Run MapReduce Jobs using Pig Scripts.

6. Setup & Configure Single node Spark cluster.

7. Read file, Kafka streaming/ spark streaming from Enterprise data lack, then do Spark Transformation Job, export processed data in form of JSON / CSV do data viz. With tableau.

8. Predictive modeling: Regression, classification, recommender etc.

9. Graph Algorithm Implementation with Spark-Graphx

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<tr><td rowspan="2">I</td><td>Q.1 (A) Viva – Voce</td><td>20</td><td rowspan="2">70</td></tr>
<tr><td>Q.1 (B) Practical</td><td>50</td></tr>
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Paper Code: CCCS939	**Total Credit :** 4
Title of Paper: Practical and Viva-Voce Based on CCCS937 and Elective Courses	**Total Marks :** 70 **Time :** 3 Hrs

Description

1. Dijkstra's shortest path algorithm
2. Prim's algorithm
3. Design Subnet & Supernet & implement in CPT
4. Packet Analysis Using Wireshark on LAN Network
5. Configure Firewall & Manage In/Out Rules
6. Installation of Ubuntu & Windows with harddisk format & data recovery
7. Software Debugging
8. Configure Virtual Machine With Realtime Network

Software List and Links:

- Open Visual Trace Route 1.6.2 - https://sourceforge.net/projects/openvisualtrace/
- Cisco Packet Tracer Student 6.2 - http://cisco.edu.mn/Download/
- Advanced Task Manager - http://filehippo.com/download_process_explorer/\
- Virtual Box By Oracle- http://filehippo.com/download_virtualbox/
- Wireshark - http://filehippo.com/download_wireshark_32/
- Whois - https://technet.microsoft.com/en-us/sysinternals/whois.aspx
- Solaris Advanced Subnet Calculator - http://downloads.solarwinds.com/solarwinds/Release/FreeTool/SolarWinds-Subnet-Calculator.zip
- Linux OS - http://distrowatch.com/
- Ollydbg v2.01 - http://www.ollydbg.de/odbg201.zip

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<tr><td>Q.1 (B) Practical</td><td>50</td></tr>
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Paper Code: CCCS940	**Total Credit :** 4
Title of Paper: Project	**Total Marks :** 70 **Time :** 3 Hrs

Description

Guidelines for the Project

- Definition should ideally reflect current trends of IT industry and it should have a high application potential.
- Project must be carried out by individual student
- Coding standards should be followed meticulously. At the minimum, the code should be self documented, modular, and should use the meaningful naming convention.
- Database design is mandatory. At least portions of code (preferably full code) are mandatory. Student may be asked to write the code related to the project during examination.
- A report should be prepared for the project work which should be duly signed by the internal project guide and head of the college/department.

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Paper Code : CCCS940	**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Project	

Unit	Description		Total Marks
I	Q.1 (A) Viva – Voce	20	70
	Q.1 (B) Explanation of Project	20	
	Q.1 (C) Explanation of Code/Database	20	
	Q.1 (D) Documentation / Report	10	

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Paper Code: CECS918		**Total Credit :** 4
Title of Paper: Research Methodology		**Total Marks :** 70 **Time :** 3 Hrs
Unit	**Description**	**Weighting**
I	Meaning, Objectives and Motivation in Research, types of Research, Research Approaches, Research Process, Validity and Reliability in Research, Obstacles in accepting research. Problem Formulation, Hypothesis Formulation, types of Hypothesis, characteristics of Good Hypothesis	**20%**
II	Meaning and Significance of Research Designs, Features of a good research design, types of research design, contents of research design Census Vs. Sample. Steps in Sample Design. Determining the size of Sample. Sampling methods - Simple Random Sampling, Stratified Sampling, Systematic Sampling, Cluster Sampling, Selective Sampling	**20%**
III	Types of Data, Sources of Data – Primary and Secondary Data. Methods of collecting the data. Testing the validity of the data. Measurement and scaling techniques, errors in measurement, tests of sound measurement, scaling and scale construction techniques	**20%**
IV	Steps in Questionnaire design, characteristics of a good questionnaire Presentation, Processing & Analysis and Interpretation of Data. Report Writing – layout of a Research Report, Characteristics of a good research report.	**20%**
V	Overview of Statistical Techniques Testing of Hypothesis, Large Sample Tests, Small Sample Tests – t, F tests. χ 2 tests.	**20%**
Basic Text & Reference Books :-		
1.	Research Methodology Methods & Techniques - C.R.Kothari, New Age International	
2.	Introduction to Quantitative Research Methods - Mark Balnaves and Peter Caputi, Sage Publications	
3.	Business Research Methods - William G.Zikmund, Thomson South-Western	

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Paper Code: CECS918			**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Research Methodology			
Unit	**Description**		**Total Marks**
I	Q.1 (A) Answer the Following. (Definitions, Blanks, Full Forms, True/False, Match the Following)	06	14
	Q.1 (B) Medium / Long Questions. (With Internal Option)	08	
II	Q.2 (A) Answer the Following. (Definitions, Blanks, Full Forms, True/False, Match the Following)	06	14
	Q.2 (B) Medium / Long Questions. (With Internal Option)	08	
III	Q.3 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.3 (B) Medium / Long Questions. (With Internal Option)	08	
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	Q.4 (B) Medium / Long Questions. (With Internal Option)	08	
V	Q.5 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.5 (B) Medium / Long Questions. (With Internal Option)	08	

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Paper Code: CCCS919		**Total Credit :** 4
Title of Paper: Software Testing and Quality Assurance		**Total Marks :** 70 **Time :** 3 Hrs
Unit	**Description**	**Weighting**
I	**Testing Environment and Test Processes** World-Class Software Testing Model – Building a Software Testing Environment - Overview of Software Testing Process – Organizing for Testing – Developing the Test Plan – Verification Testing – Analyzing and Reporting Test Results – Acceptance Testing – Operational Testing – Post Implementation Analysis	**20%**
II	**Testing Techniques** Using White Box Approach to Test design, Static Testing Vs. Structural Testing, Code Functional Testing, Coverage and Control Flow Graphs, Using Black Box Approaches to Test Case Design, Random Testing, Requirements based testing, Decision tables, State-based testing, Cause-effect graphing, Error guessing, Compatibility testing, Levels of Testing, Unit Testing, Integration Testing, Defect Bash Elimination. System Testing, Usability and Accessibility Testing, Configuration Testing, Compatibility Testing, Case study for White box testing and Black box testing techniques.	**20%**
III	**Incorporating Specialized Testing Responsibilities** Testing Client/Server Systems, Rapid Application Development Testing, Testing in a Multiplatform Environment, Testing Software System Security, Testing Object-Oriented Software, Object Oriented Testing, Testing Web based systems, Web based system, Web Technology Evolution, Traditional Software and Web based Software, Challenges in Testing for Web-based Software, Testing a Data Warehouse, Case Study for Web Application Testing.	**20%**
IV	**Test Automation** Selecting and Installing Software Testing Tools, Software Test Automation, Skills needed for Automation, Scope of Automation, Design and Architecture for Automation – Requirements for a Test Tool, Challenges in Automation, Tracking the Bug, Debugging, Case study using Bug Tracking Tool	**20%**
V	**Software Testing and Quality Matrices** Testing Software System Security, Six-Sigma, TQM, Complexity Metrics and Models, Quality Management Metrics, Availability Metrics, Defect Removal Effectiveness, FMEA, Quality Function. Deployment, Taguchi Quality Loss Function, Cost of Quality. Case Study for Complexity and Object, Oriented Metrics	**20%**
Basic Text & Reference Books :-		
1.	William Perry, "Effective Methods of Software Testing", Third Edition,Wiley Publishing 2007	
2.	Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing – Principles and Practices",Pearson Education, 2007	
3.	Naresh Chauhan , "Software Testing Principles and Practices " Oxford University Press , NewDelhi , 2010.	
4.	Stephen Kan, "Metrics and Models in Software Quality", Addison – Wesley, Second Edition,2004.	
5.	Boris Beizer, " Software Testing Techniques" – 2nd Edition, Van Nostrand Reinhold, New York,1990	

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Semester: IX

Paper Code: CECS919			**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Software Testing and Quality Assurance			
Unit	**Description**		**Total Marks**
I	Q.1 (A) Answer the Following. (Definitions, Blanks, Full Forms, True/False, Match the Following)	06	14
	Q.1 (B) Medium / Long Questions. (With Internal Option)	08	
II	Q.2 (A) Answer the Following. (Definitions, Blanks, Full Forms, True/False, Match the Following)	06	14
	Q.2 (B) Medium / Long Questions. (With Internal Option)	08	
III	Q.3 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.3 (B) Medium / Long Questions. (With Internal Option)	08	
IV	Q.4 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.4 (B) Medium / Long Questions. (With Internal Option)	08	
V	Q.5 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.5 (B) Medium / Long Questions. (With Internal Option)	08	