KRANTIGURU SHYAMJI KRISHNA VERMA
KACHCHH UNIVERSITY

Department of Computer Science

Syllabus for Two Years Full Time

Master of Science (Information Technology)

(Effective From June 2016)

Krantiguru Shyamji Krishna Verma Kachchh University, Bhuj

Master of Science
(Information Technology)
Two Years Full Time Program

This course abbreviated as M.Sc. (IT) is a post-graduate programme of 04 semester's duration.

CREDIT SYSTEM

One credit in theory course is equivalent to classroom teaching of 1 hour per week for 15 weeks, whereas one credit in practical requires 1.5 hours of performing practical per week for 15 weeks.

ELIGIBILITY CRITERIA

1. A candidate who have passed B.C.A./B.Sc. (CS/IT), B.Tech (CS, IT) or equivalent degree in computer science or information technology with minimum 40% marks is eligible to apply.
2. A candidate who has passed an equivalent examination from any other university/examining body shall have to produce Eligibility Certificate from KSKV Kachchh University, Bhuj (which can be obtained from the University Office) along with the application for admission in the first semester.

DOCUMENTS REQUIRED

Original as well as self attested copies of

1. S.S.C (10^{th}) mark sheet, Passing and Trial Certificate.
2. H.S.C. (10+2) or Equivalent Mark sheet.
3. Mark sheets of the qualifying degree.
4. Degree Certificate of the qualifying degree.
5. Transfer / Leaving Certificate.
6. SC/ST/SEBC caste certificate wherever applicable.
7. Non-Creamy Layer Certificate in case of SEBC
8. Relevant reservation documents as notified by the government.

ADMISSION PROCEDURE

- Counselling will be given to the candidates on the day of admission before actual admission takes place in each college.

CRITERIA FOR EVALUATION

- Continuous and Comprehensive Evaluation (CCE) will be conducted by respective departments; CCE will have 30% weightage. A student shall have to score minimum 40% marks in internal evaluation to pass.
- End semester examination will have 70% weightage. A student shall have to score minimum 40% marks in internal evaluation to pass.
- CCE Marking Scheme for theory courses other than foundation:
  For each paper, 30 % of CCE may be further distributed as under:
  a) Seminar/Assignment/Project/Presentation : 10 Marks
  b) Internal Test: 20 Marks

  Internal Test comprises of 40 Marks and $1\frac{1}{2}$ hours duration.

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester I

Course Type	Course Code	Name of Course	T / P	Credit	Exam Duration in Hours	Component of Marks		
						Internal	External	Total
Core Courses	CCCS101	Advanced Web Programming	Theory	4	2.5	30	70	100
	CCCS102	Mobile Computing	Theory	4	2.5	30	70	100
	CCCS103	Data warehousing and Data mining	Theory	4	2.5	30	70	100
	CCCS104	Practical Based on CCCS726	Practical	5	2.5	30	70	100
	CCCS105	Practical Based on CCCS727 and Elective Courses	Practical	5	2.5	30	70	100
Elective Courses (Any One)	CECS101	Advanced Operating Systems	Theory	4	2.5	30	70	100
	CECS103	Enterprise Resource Planning	Theory	4	2.5	30	70	100
Total				**26**		**180**	**420**	**600**

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: I

Paper Code: CCCS101		**Total Credit :** 4
Title of Paper: Advanced Web Programming		**Total Marks :** 70 **Time :** 3 Hrs
Unit	**Description**	**Weighting**
I	***Introduction to C#:*** C# : Data Types(Boxing and UnBoxing), Operators, Access Specifier, OOPS Concepts: Class, Inheritance, Constructor, Destructor, Abstraction, interface, polymorphism (Over loading and over ridding), Garbage Collection, Array (One Dimensional and Two Dimensional), Jagged Array, Collection: Generic Collection (List),Non Generic Collection (Array list, Hash table,),Indexer(One Dimension) and property, Delegates and events(Multicasting , Multicasting Event),Exception Handling, Introduction to Namespace: Creating & Using Namespace(DLL)	**20%**
II	***ADO.Net*** Architecture of ADO.Net, Comparison with ADO(Connected and Disconnected Architecture),.Net Data provider, Data Adapter, Data Set, Data Row, Data Column, Data Relation, command, Data Reader, Creating and Using Stored Procedure	**20%**
III	***Overview of Asp.NET Framework*** Client Server Architecture, Application Web Servers, Installation of IIS server, Types of Files in Asp.NET, Types of controls in Asp.NET, Page Architecture, Adding Controls to a Webpage, The Page Class, Webfor Introduction to standard Controls (Buttons, Textbox, Checkbox, Label, Panel, List box, Drop down list etc.) Running an Asp.Net Application, File Upload Control What is Validation? Client Side Validation, Server Side Validation Types (RequieredField Validator, Range Validator, CompareField Validator, RegularExpression Validator, Custom Validator, ValidationSummery Control)	**20%**
IV	ASP.NET Page Life Cycle, Server Controls : label, dropdown list box, validation controls, list box, text box, radio button, check box, State Management : session, cookie, View State, Data Rendering Controls: Grid View, Data List, Repeater, Binding and perform operations (Insert, Update, Delete) with Grid View, Creating Simple 3-tier Application, Creating and Using web services. ***Introduction to AJAX*** Understanding Need of Ajax in Web Application, Ajax controls: Script Manager, Update Panel, Update Progress, Timer Reading Datasets From XML Writing DataSets With XML, WebServices (Introduction, HTTP, SOAP, UDDI,XML, Creating a Web Servic, Consuming a Web Service)	**20%**
V	**State Management:** What is State? Why is it Required in Asp.Net? Client Side State Management, Server Side State Management Various State Management Techniques (View State, Query String, Cookie, Session State, Application State) **What is Master Page?** Requirement Of a Master Page in an Asp.NET application Designing Website with Master Page, Theme and CSS	**20%**

	Caching Application pages and Data Overview, Page Output Caching, Partial Page Caching, Absolute Cache Expiration, Sliding Cache Expiration, Data Caching	
Basic Text & Reference Books :-		
1.	Asp.Net – Unleashed	
2.	Complete Reference C# - Herbert schildt (TMH Publication)	

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: I

Paper Code: CCCS101			**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Advanced Web Programming			
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) Program based on C#. (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) Program based on ASP.Net. (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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Master of Science (Information Technology)
Semester: I

Paper Code: CCCS102	**Total Credit :** 4
Title of Paper: Mobile Computing	**Total Marks :** 70 **Time :** 3 Hrs

Unit	Description	Weighting
I	**Introduction To Mobile Apps:** Why we Need Mobile Apps, Different Kinds of Mobile Apps, Briefly about Android **Introduction Android:** History Behind Android Development, What is Android?, Pre-requisites to learn Android, Brief Discussion on Java Programming **Android Architecture:** Overview of Android Stack, Android Features, Introduction to OS layers **Deep Overview in Android Stack:** Linux Kernel, Libraries, Android Runtime, Application Framework, Dalvik VM **Installing Android Machine:** Configuring Android Stack, Creating Eclipse Environment, Integrating Android with Eclipse IDE, Exploring Eclipse IDE	
II	**Creating First Android Application:** Creating Android Project, Debugging Application through DDMS, Setting up environment, AVD Creation, Executing Project on Android Screen **Android Components:** Activities, Services, Broadcast Receivers, Content Providers **Hello World App:** Creating your first project, The manifest file, Layout resource, Running your app on Emulator **Building UI with Activities:** Activities, Views, layouts and Common UI components, Creating UI through code and XML, Activity lifecycle, Intents, Communicating data among Activities **Advanced UI:** Selection components (GridView, ListView, Spinner), Adapters, Custom Adapters, Complex UI components, Building UI for performance, Menus, Creating custom and compound Views	
III	**Notifications:** Toast, Custom Toast, Dialogs, Status bar Notifications **Styles And Themes:** Creating and Applying simple Style, Inheriting built-in Style and User defined style, Using Styles as themes **Resources and Assets:** Android Resource, Using resources in XML and code, Localization, Handling Runtime configuration change **Intent, Intent Filters and Broadcast Receivers:** Role of filters, Intent-matching rules, Filters in your manifest, Filters in dynamic Broadcast Receivers, Creating Broadcast receiver **Receiving System Broadcast:** Understanding Broadcast action, category and data, Registering Broadcast receiver through code and through XML, Sending Broadcast	
IV	**Data Storage:** Shared Preferences, Android File System, Internal storage, External storage, SQLite **Introducing SQLite:** SQLiteOpenHelper and creating a database, Opening and closing a database, Working with cursors Inserts, updates, and deletes **Content Providers:** Accessing built in content providers, Content provider MIME types, Searching for content, Adding, changing, and removing content, Creating content provider, Working with content files **Services:** Overview of services in Android, Implementing a Service, Service lifecycle, Inter Process Communication (AIDL Services) **Multimedia in Android:** Drawing and Working with Animation, Multimedia Supported audio formats, Simple media playback,	

	Supported video formats, Simple video playback **Location Based Services and Google Maps:** Using 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, Itemized overlays, Geocoder, Displaying route on map	
V	**Web Services and WebView:** Consuming web services, Receiving HTTP Response (XML, JSON) Parsing JSON and XML, Using We, View **Sensors:** How Sensors work, Using Orientation and Accelerometer sensors, Best practices for performance **WiFi:** Monitoring and managing Internet connectivity, Managing active connections, Managing WiFi networks **Telephony Services:** Making calls, Monitoring data connectivity and activity, Accessing phone properties and status, Controlling the phone, Sending messages **Camera:** Taking pictures, Media Recorder, Rendering previews **Bluetooth:** Controlling local Bluetooth device, Discovering and bonding with Bluetooth devices, Managing Bluetooth connections, Communicating with Bluetooth **Android Application Deployment:** Android Application Deployment on Android Market	
Basic Text & Reference Books :-		
1.	Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011)	
2.	Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd (2011)	
3.	Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd(2009)	
4.	Sayed Y Hashimi and Satya Komatineni, "Pro Android", Wiley India Pvt Ltd(2009)	

Chapter wise Coverage from Text Book:

Chapters: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 19, 20, 21, 29

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Master of Science (Information Technology)
Semester: I

Paper Code: CCCS102			**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Mobile Computing			
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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Master of Science (Information Technology)
Semester: I

Paper Code: CCCS103	**Total Credit :** 4
Title of Paper: Data Warehousing and Data Mining	**Total Marks :** 70 **Time :** 3 Hrs

Unit	Description	Weighting
I	***Introduction*** An overview and definition along with clear understanding of the four appearing in the definition. Differences between Operational Database Systems and Data Warehouses Overview of Multi-dimensional Data Model, and the basic differentiation between "Fact"and "Dimension"; Multi-dimensional Cube Concept Hierarchies of "Dimensions" Parameters: Examples and the advantages. Star, Snowflakes, and Fact Constellations Schemas for Multi-dimensional Databases Measures: Their Categorization and Computation, Pre-computation of Cubes, Constraint on Storage Space, Possible Solutions OLAP Operations in Multi-dimensional Data Model: Roll-up, Drill-down, Slice & Dice, Pivot (Rotate). Indexing OLAP Data; Efficient Processing of OLAP Queries. Type of OLAP Servers: ROLAP versus MOLAP versus HOLAP, Metadata Repository	**20%**
II	***Data warehouse Architecture*** The Design of A Data Warehouse: A Business Analysis Framework; The Process of Data Warehouse Design, A 3-Tier Data Warehouse Architecture; Enterprise Warehouse, Data mart, Virtual Warehouse, Discovery-Driven Exploration of Data Cubes; Complex Aggregation at Multiple Granularity: Multi-feature Cubes, Constrained Gradient Analysis of Data Cubes	**20%**
III	***Pre-Processing*** The need for Pre-processing, Descriptive Data Summarization Data Cleaning: Missing Values, Noisy Data, Data Cleaning as a Process Data Integration & Transformation, Data Cube Aggregation; Attribute Subset Selection, Dimensionality Reduction:(Basic Concepts only). Numerosity Reduction: Regression & Log-linear Models, Histograms, Clustering, Sampling. Data Dicretization & Concept Hierarchy Generation For Numerical Data: Binning, Histogram Analysis, Entropy-based Discretization, Interval Merging by χ Analysis, Cluster Analysis, Discretization by Intuitive Partitioning For Categorical Data	**20%**
IV	***Data Mining- An Introduction*** An Overview; What is Data Mining; Data Mining - on What Kind of Data Data Mining Functionalities - What Kind of Patterns Can be Mined; Concept/Class Description: Characterization & Discrimination; Mining Frequent Patterns, Associations, and Correlations; Classification & Prediction; Cluster Analysis; Outlier Analysis, Classification of Data Mining Systems Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System, Major Issues in Data Mining	**20%**
V	***Mining Frequent Pattern, Association and correlations*** Basic Concepts: Market Basket Analysis; Frequent Itemsets, Closed Itemsets, and Association Rules; Frequent Pattern Mining: A Roadmap Apriori Algorithm: Finding Frequent Itemsets Using Candidate Generation; Generating Association Rules from Frequent Itemsets; Improving the Efficiency of Apriori. From Association Mining to Correlation Analysis; Interesting: An Example; From Association Analysis to Correlation Analysis Introduction to Classification and Prediction, Supervised learning, Unsupervised learning, Classification by decision tree induction	**20%**
Basic Text & Reference Books :-		
1.	Jiawei Han & Micheline Kamber, "Data Mining: Concepts & Techniques", Morgan Kaufmann Publishers (2002)	

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Master of Science (Information Technology)
Semester: I

Paper Code: CCCS103			**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Data Warehousing and Data Mining			
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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Master of Science (Information Technology)
Semester: IT

Paper Code: CCCS104	**Total Credit :** 4
Title of Paper: Practical Based on CCCS101	**Total Marks :** 70 **Time :** 3 Hrs
Description	
1. Understanding of Constructor and Destructor using C# 2. Demonstration of Array and Collection 3. Understanding Inheritance 4. Understanding Exception handling 5. Understanding Polymorphism 6. Understanding Indexers 7. Demonstration of ADO.Net and its various components 8. Understanding of IIS server, loading and installing 9. Understanding various controls of ASP.Net 10. Demonstration of client side and server side validation 11. Understanding of session and cookie 12. Demonstration of AJAX controls 13. Demonstration of reading data sets using XML 14. Understanding of various web services 15. Understanding of various state management techniques	

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Master of Science (Information Technology)
Semester: IT

Paper Code : CCCS104			**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Practical Based on CCCS101			
Unit	**Description**		**Total Marks**
I	Q.1 (A) Viva – Voce	20	70
	Q.1 (B) Practical	50	

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Semester: I

Paper Code: CCCS105	**Total Credit :** 4
Title of Paper: Practical Based on CCCS102 and Elective Courses	**Total Marks :** 70 **Time :** 3 Hrs

Description

1. Understanding of android stack
2. Understanding of Eclipse IDE
3. Understanding Android components
4. Demonstration of UI components
5. Demonstration of Activity life cycle
6. Demonstration of advanced UI components
7. Understanding Notifications
8. Understanding style and themes
9. Understanding of resources and assets
10. Understanding broadcast action and procedure
11. Understanding of SQLite and its operations
12. Understanding of Android services
13. Demonstration of Multimedia activities in android
14. Understanding location based services using android
15. Understanding Google map
16. Understanding of sensors and Wi-Fi
17. Understanding of bluetooth, camera and telephony services
18. Demonstration of Android application deployment

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Semester: I

<table>
<tr><td colspan="3">Paper Code : CCCS105</td><td rowspan="2">Total Credit : 4
Total Marks : 70
Time : 3 Hrs</td></tr>
<tr><td colspan="3">Title of Paper: Practical Based on CCCS102 and Elective Courses</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td>Unit</td><td colspan="2">Description</td><td>Total Marks</td></tr>
<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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Master of Science (Information Technology)
Semester: I

Paper Code: CECS101		**Total Credit :** 4
Title of Paper: Advanced Operating Systems		**Total Marks :** 70 **Time :** 3 Hrs
Unit	**Description**	**Weighting**
I	Introduction, types of operating systems, functions of operating systems. Introduction and Communication Models, Message Passing, Shared Memory, RPC	**20%**
II	Deadlock and Concurrency: Deadlocks, Conditions for deadlock, Deadlock modedling, Strategies for handling deadlocks, Starvation (The dining philosopher problem), Parallel Processing, Process Synchronization, Test and set, WAIT and SIGNAL, Semaphores, Process Cooperation, Producer and Consumers, Readers and Writers Problem	**20%**
III	Scheduling : Introduction Scheduling algorithms : FCFS, SJN, Priority, SRT, RR Application of the Scheduling Algorithm	**20%**
IV	File systems : File manager, Interacting with file manager, Physical storage allocation, Data compression, Access methods, Access controls Kernel types, Kernel architecture of Windows and Linux operating systems	**20%**
V	Advanced Linux Shell scripting and Script commands, System calls Linux Kernel and device driver programming Linux network and system administration, www, mail, FTP, samba	**20%**
Basic Text & Reference Books :-		
1.	UNIX – Concepts & Application, Sumitabha Das, BPB	
2.	Professional Linux Kernel Architecture by Wolfgang Mauerer Publisher: Wiley India Pvt Ltd (December 2008)	

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Master of Science (Information Technology)
Semester: I

Paper Code: CECS101			**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Advanced Operating System			
Unit	**Description**		**Total Marks**
I	Q.1 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.1 (B) Medium / Long Questions. (With Internal Option)	08	
II	Q.2 (A) Short / Medium Questions (With Internal Option)	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) Shell Scripting Commands (With Internal Option)	06	14
	Q.5 (B) Shell Scripting Questions. (With Internal Option)	08	

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Master of Science (Information Technology)
Semester: I

Paper Code: CECS103		**Total Credit :** 4
Title of Paper: Enterprise Resource Planning		**Total Marks :** 70 **Time :** 3 Hrs
Unit	**Description**	**Weighting**
I	**Introduction** Enterprise Resource Planning (ERP) : introduction, history, advantages Enterprise : introduction, business modeling, integrated data model, integrated management information Basic concepts of ERP Risks and benefits of ERP	
II	**ERP and Related Technologies** Introduction to MRP, MRP-II and ERP Business Process Reengineering (BPR) Data warehousing, data mining and Online Analytical Processing (OLAP) Product Life Cycle Management (PLM), Supply Chain Management (SCM), Customer Relationship Management (CRM)	
III	**ERP Marketplace and Functional Modules** Marketplace : overview, dynamics, changing ERP market Indian ERP Scenario Functional modules of ERP software Integration of ERP, SCM and CRM	
IV	**ERP – Selection and Implementation** ERP package selection ERP Implementation basics, ERP Implementation Life Cycle Post implementation activities Success and Failure Factors of an ERP Implementation	
V	**The Business Modules** Finance, Manufacturing, Human Resources, Plant Maintenance Quality Management, Sales, Distribution and Service, Marketing	
Basic Text & Reference Books :-		
1.	Alexis Leon : Enterprise Resource Planning, Tata McGraw-Hill, New Delhi 1st and 2nd editions.	

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: I

Paper Code: CECS103			**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Enterprise Resource Planning			
Unit	**Description**		**Total Marks**
I	Q.1 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.1 (B) Medium / Long Questions. (With Internal Option)	08	
II	Q.2 (A) Short / Medium Questions (With Internal Option)	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	

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester II

Course Type	Course Code	Name of Course	T / P	Credit	Exam Duration in Hours	Component of Marks		
						Internal	External	Total
Core Courses	CCCS201	Advanced Java Programming	Theory	4	2.5	30	70	100
	CCCS202	Cryptography	Theory	4	2.5	30	70	100
	CCCS203	Artificial Intelligence	Theory	4	2.5			
	CCCS204	Practical Based on PS CCCS201	Practical	5	2.5	30	70	100
	CCCS205	Practical Based on PS CCCS203	Practical	5	2.5	30	70	100
Foundation Course	FCCS201	Foundation Course of BAOU	Theory	8	2.5	-	100	100
Elective Courses (Any One)	CECS204	Software Testing and Quality Assurance	Theory	4	2.5	30	70	100
	CECS206	Embedded System	Theory	4	2.5	30	70	100
Total				**34**		**180**	**420**	**600**

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Master of Science (Information Technology)
Semester: II

Paper Code: CCCS201		**Total Credit :** 4
Title of Paper: Advanced Java Programming		**Total Marks :** 70 **Time :** 3 Hrs
Unit	**Description**	**Weighting**
I	Introduction to J2EE Platform and Architecture The J2EE Platform, The J2EE Architecture Containers, J2EE Technologies, Developing J2EE Applications, Introducing Java Mail and JMS	**20%**
II	Database Programming ODBC and JDBC Drivers, Connecting to Database with the java.sql Package, Using JDBC	**20%**
III	*Servlets* Introduction to Servlets and architecture , Servlet Life Cycle, Servlet based Applications, type of servlet, Servlet and HTML, Session management *JSP* Introduction to JSP, JSP implicit objects, JSP based Applications, Session Management	**20%**
IV	*Remote Method Invocation (RMI)* The RMI Architecture, RMI Exceptions Developing Applications With RMI, Parameter Passing in RMI *XML* XML syntax and semantics, Writing Document Type Definitions (DTDs), XML based applications	**20%**
V	*Java Beans* An overview of Java Beans Requirement, Development and Scope of Java Beans Design consideration and Naming conventions of Java Beans and Guideline. *Enterprise Java Beans (EJB)* Introduction to EJB Entity Beans Session Beans	**20%**
Basic Text & Reference Books :-		
1.	Professional Java Server Programming by Subrahmanyam Allamaraju	
2.	J2EE Bible by Justin Couch and Deniel H. Steinberg	
3.	Professional Java Server Programming Volume I and II, Wrox Publication.	
4.	J2EE Unleashed by Joseph J. Bambara, BPB publications	
5.	Enterprise JAVA J2EE 1.3 complete, BPB publications	

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: II

Paper Code: CCCS201			**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Advanced Java Programming			
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) Programs. (With Internal Option)	08	
V	Q.5 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.5 (B) Programs. (With Internal Option)	08	

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Semester: II

Paper Code: CCCS202		**Total Credit :** 4
Title of Paper: Cryptography		**Total Marks :** 70 **Time :** 3 Hrs
Unit	**Description**	**Weighting**
I	**Introduction** Security Trends, OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, History and Overview of Cryptology	**20%**
II	**Symmetric Ciphers** Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines / Enigma, Steganography Block Ciphers: Principles, Data Encryption Standard/ 3DES, DES Operation, DES Strength, Block Cipher Design Principles	**20%**
III	**Asymmetric Ciphers** Prime Numbers, Principles of Public Key Cryptosystems, The RSA Algorithm, Diffie-Hellman Key Exchange, Pseudorandom Number Generation, Cryptographic Hash Functions, Secure Hash Algorithm, Message Authentication Codes, Digital Signatures	**20%**
IV	**Network and Internet Security** Key Distribution, X.509 Certificates, Public Key Infrastructure, Web Security Issues, Secure Sockets Layer (SSL), Transport Layer Security (TLS), HTTPS, Secure Shell (SSH), Wireless Network Security Overview, Email Security: PGP, S/MIME, DKIM.	**20%**
V	**Scams and Cyber Laws** DoS and DDoS attacks, CAPTCHA, Spam, Phishing, Ponzi Schemes, Indian IT Act 2000 with Subsequent Amendments.	**20%**
Basic Text & Reference Books :-		
1.	Cryptography and Network Security, William Stallings, Pearson	

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: II

Paper Code: CCCS202			**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Cryptography			
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	

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: II

Paper Code: CCCS203	**Total Credit :** 4
Title of Paper: Artificial Intelligence	**Total Marks :** 70 **Time :** 3 Hrs

Unit	Description	Weighting
I	**Artificial Intelligence and Knowledge-Based Systems** Natural and Artificial Intelligence – Characteristics and Definitions of AI AI based systems, Testing the Intelligence with Turing Test, and Chinese Room Experiment, Application Areas of Artificial Intelligence, Data Pyramid and Computer Based Systems Production Systems and AI based Searches like Hill Climbing and Heuristic Search Introduction & Objectives of KBS, Components of KBS Categories of the KBS like Expert Systems, Database Management Systems in Conjunction with an Intelligent User Interface, Linked Systems, CASE Based Systems, Intelligent Tutoring Systems, etc. Issues and limitations of KBS General structure of KBS, Conflict Resolution Strategies for Rule Based Systems Knowledge Base Shell Advantages, limitations and applications of Knowledge-Based Systems	**20%**
II	**Development of Knowledge-Based Systems** Development of Knowledge-Based System, Difficulties in KBS Development Knowledge-Based Systems Development Model, Knowledge Acquisition Process and Techniques, Knowledge Sharing, Dealing with Multiple Experts, Issues in Knowledge Acquisition, Knowledge Update Characteristics of Good Knowledge Representation Scheme Factual and Procedural Knowledge Representation Applications and Users of KBS Tools for KBS development and Case Studies	**20%**
III	**Fuzzy Logic** Introduction to fuzzy logic Fuzzy logic and fuzzy sets, Membership Functions, Fuzzification and Defuzzification, Operations on Fuzzy Sets Fuzzy Functions and Linguistic Variables Fuzzy Relationships, Propositions and Connectives Fuzzy Inference Fuzzy Rules, Fuzzy Control System and Fuzzy Rule Based Systems	**20%**
IV	**Neural Network** Neural Networks: Introduction, Advantages and Disadvantages of Neural Networks Biological Neuron and Artificial Neuron Neural Network Architectures Applications of Neural Network	**20%**
V	**Genetic Algorithm** Introduction to Genetic Algorithm Basic Terminology, Genetic Algorithm, GA Cycle Basic Operator of GA, Function Optimization Introduction to Prolog Prolog Application and Programs	**20%**

Basic Text & Reference Books :-

1.	Elain Rich: “Artificial Intelligence”, McGraw Hill, Third Edition, 2001.
2.	R. Akerkar: “Introduction to Artificial Intelligence”, Prentice Hall of India, 2005.
3.	R. Akerker and P. S. Sajja: “Knowledge-Based Systems”, Jones and Bartlettes, MIT, 2010

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: II

Paper Code: CCCS203			**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Artificial Intelligence			
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) Prolog Programs. (With Internal Option)	08	

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: II

Paper Code: CCCS204	**Total Credit :** 4
Title of Paper: Practical Based on CCCS201	**Total Marks :** 70 **Time :** 3 Hrs
Description	
1. Understanding J2EE Architecture 2. Demonstration of JDBC connectivity. 3. Understanding Java Mail and JMS. 4. Understanding Servlet Architecture 5. Understanding JSP and JSP objects 6. Demonstration of Session Management 7. Understanding RMI Architecture 8. Understanding RMI with XML. 9. Demonstration of XML based applications 10. Understating EJB	

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: II

Paper Code : CCCS204			**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Practical Based on CCCS201			
Unit	**Description**		**Total Marks**
I	Q.1 (A) Viva – Voce	20	70
	Q.1 (B) Practical	50	

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: II

Paper Code: CCCS205	**Total Credit :** 4
Title of Paper: Practical Based on CCCS203	**Total Marks :** 70 **Time :** 3 Hrs
Description	
1. Understanding Turbo Prolog: Installing, Running Programs, Saving and Loading Files 2. Understanding Prolog Syntax and Semantics. 3. Understanding Branching. 4. Understanding Looping. 5. Understanding Functions and Parameters. 6. Understanding List 7. Understanding various objects. 8. Understanding Recursion.	

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: II

Paper Code : CCCS205			**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Practical Based on CCCS203			
Unit	**Description**		**Total Marks**
I	Q.1 (A) Viva – Voce	20	70
	Q.1 (B) Practical	50	

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: II

Paper Code: CECS203	**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

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: II

Paper Code: CECS203			**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	

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: II

Paper Code: CECS204	**Total Credit :** 4
Title of Paper: Embedded Systems	**Total Marks :** 70 **Time :** 3 Hrs

Unit	Description	Weighting
I	**Introduction** What is IoT?, Examples of IoT, Appliances, Smart Health care, Oil & Gas Industry, Smart Places, IoT v/s Computer v/s Smartphone, Adoption and trends in IoT, Social benefits of IoT, Risk-Security-Privacy of IoT. Embedded Systems: An introduction to embedded systems, examples, generic structure of embedded system, sensors and actuators, Analog / Digital Conversion, basic devices.	**20%**
II	**Arduino Basics** IDE, Setting up Arduino Board, Arduino Sketch, Uploading and Running Blink Sketch, Creating and Saving Sketch, Structure of Sketch, Primitive Types, Functional Blocks, Conditions, Loops, Operators.	**20%**
III	**Arduino Communications** Sending Debug Information from Arduino to Your Computer, Sending Formatted Text and Numeric Data from Arduino, Receiving Serial Data in Arduino, Sending Multiple Text Fields from Arduino in a Single Message, Receiving Multiple Text Fields in a Single Message in Arduino, Sending Binary Data from Arduino, Receiving Binary Data from Arduino on a Computer, Sending Binary Values from Processing to Arduino, Sending the Value of Multiple Arduino Pins, How to Move the Mouse Cursor on a PC or Mac, Controlling Google Earth Using Arduino, Logging Arduino Data to a File on Your Computer, Sending Data to Two Serial Devices at the Same Time, Receiving Serial Data from Two Devices at the Same Time, Setting Up Processing on Your Computer to Send and Receive Serial Data.	**20%**
IV	**Input** Using a Switch, Using a Switch Without External Resistors, Reliably Detecting the Closing of a Switch, Determining How Long a Switch Is Pressed, Reading a Keypad, Reading Analog Values, Changing the Range of Values, Reading More Than Six Analog Inputs, Displaying Voltages Up to 5V, Responding to Changes in Voltage, Measuring Voltages More Than 5V (Voltage Dividers) Detecting Movement, Detecting Light, Detecting Motion (Integrating Passive Infrared Detectors), Measuring Distance, Measuring Distance Accurately, Detecting Vibration, Detecting Sound, Measuring Temperature, Reading RFID Tags, Tracking Rotary Movement, Using a Mouse, Getting Location from a GPS	**20%**
V	**Introduction to Raspberry Pi** A Tour of the Boards, The Proper Peripherals, The Case, Flash the SD Card, Booting Up, Configuring Your Pi, Shutting Down, Troubleshooting **Linux on the Raspberry Pi** Using the Command Line, Files and the Filesystem, More Linux Commands, Processes, Sudo and Permissions, The Network, /etc, Setting the Date and Time, Installing New Software, Python on Raspberry Pi **Programming Inputs and Outputs with Python** Installing and Testing GPIO in Python, Blinking an LED, Reading a Button **Working with Webcams** Testing Webcams, Installing and Testing SimpleCV, Displaying an Image.	**20%**

Basic Text & Reference Books :-

1. Arduino Cookbook, Michael Margolis, O'Reilly
2. Getting Started with Raspberry Pi, Matt Richardson, O'Reilly

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: II

Paper Code: CECS204			**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Embedded Systems			
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	

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester III

Course Type	Course Code	Name of Course	T / P	Credit	Exam Duration in Hours	Component of Marks		
						Internal	External	Total
Core Courses	CCCS306	Data Science	Theory	4	2.5	30	70	100
	CCCS307	Advanced Networking	Theory	4	2.5	30	70	100
	CCCS308	Practical / Viva Voce Based on CCCS306	Practical	5	2.5	30	70	100
	CCCS309	Practical / Viva Voce Based on CCCS307 and Elective Courses	Practical	5	2.5	30	70	100
	CCCS310	Project	Practical	4	-	30	70	100
Elective Courses (Any One)	CECS305	Research Methodology	Theory	4	2.5	30	70	100
	CECS306	System Software	Theory	4	2.5	30	70	100
Total				**26**		**180**	**420**	**600**

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: III

Paper Code: CCCS306	**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

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: III

Paper Code: CCCS306			**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
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	

Krantiguru Shyamji Krishna Verma Kachchh University
Program: MSc III
Semester: III

Paper Code: CCCS307		**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	

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: III

Paper Code: CCCS307			**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	
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	

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: III

Paper Code: CCCS308	**Total Credit :** 4
Title of Paper: Practical Based on CCCS306	**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

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: III

Paper Code : CCCS308			**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: Practical Based on CCCS306			
Unit	**Description**		**Total Marks**
I	Q.1 (A) Viva – Voce	20	70
	Q.1 (B) Practical	50	

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Master of Science (Information Technology)
Semester: III

Paper Code: CCCS309	**Total Credit :** 4
Title of Paper: Practical and Viva-Voce Based on CCCS307 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

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: III

<table>
<tr><td colspan="3">Paper Code : CCCS309</td><td rowspan="2">Total Credit : 4
Total Marks : 70
Time : 3 Hrs</td></tr>
<tr><td colspan="3">Title of Paper: Practical and Viva-Voce Based on CCCS307 and Elective Courses</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td>Unit</td><td colspan="2">Description</td><td>Total Marks</td></tr>
<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>
</table>

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: III

Paper Code: CCCS310	**Total Credit :** 04
Title of Paper: Project	**Total Marks :** 70 **Time :** 3 Hrs

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.

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: III

Paper Code : CCCS310	**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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Master of Science (Information Technology)
Semester: III

Paper Code: CECS305	**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

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: III

Paper Code: CECS305			**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	
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	

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: III

Paper Code: CECS306	**Total Credit :** 4
Title of Paper: System Software	**Total Marks :** 70 **Time :** 3 Hrs

Unit	Description	Weighting
I	**Language Processors and Compilers** Introduction to language processing Language processing activities: program generation, program execution, program interpretation Meaning of analysis and synthesis in language processing Introduction to compilers The analysis-synthesis model of compilation The phases of a compiler	
II	**Fundamentals of Assembly Language and Assemblers** Elements of assembly language programming Description of a simple assembly language Description of different types of assembly language statements : imperative statements, declaration statements, assembler directives Advantages of assembly language A simple assembly scheme : design specification of assemblers, phases and data structures Design of a two pass assembler	
III	**Editors, Linkers and Loaders** Editors : line editors, stream editors, screen editors, word processors, structure editors, design of editors Translated, linked and load time addresses Relocation and linking concepts : program relocation, performing relocation The process of linking The concept of loading	
IV	**System Software Tools** List of software tools for program development and their description Debug monitors Producing debug information Programming environments User interface tools	
V	**Micro-Processor and Other System Software** Basic macro processor functions – Macro Definition and Expansion – Macro Processor Algorithm and data structures – Implementation examples: MASM Macro Processor- Text editors – Overview of Editing Process - User Interface – Editor Structure – Interactive Debugging Systems – Debugging functions and capabilities –Relationships with Other parts of the system – User Interface Criteria. - Virtual Machines	

Basic Text & Reference Books :-

1.	Dhamdhare, D M : "System programming and Operating system", 2nd revised edition, Tata McGraw-Hill Company Limited, 2004
2.	Aho A. V., Sethi R., Ullman J. D. : Compilers - Principles, Techniques and Tools, Addition-Wesley Publishing Company, 1988.
3.	Srimanta Pal, " Systems Programming " , Oxford University Press, 2011

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: III

Paper Code: CECS306			**Total Credit :** 4 **Total Marks :** 70 **Time :** 3 Hrs
Title of Paper: System Software			
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) Short / Medium Questions. (With Internal Option)	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	

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester IV

Course Type	Course Code	Name of Course	T / P	Credit	Exam Duration in Hours	Component of Marks		
						Internal	External	Total
Core Courses	CCCS401	Industrial Project	-	24	-	180	420	600
Total				**24**		**180**	**420**	**600**

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: IV

Title of Paper: Industrial Project **Paper Code:** CECS401	**Total Credit :** 24 **Total Marks :** 420 **Time :** 3 Hrs

Guidelines for Project

- The project definition should be initiated during the summer break after semester IV examination.
- "Shodh Yatras" to industries will help achieving this first major step.
- Definition should ideally reflect current trends of IT industry and it should have a high application potential.
- A "Letter of Acceptance" from the company has to be obtained and submitted to the college/department by the student.
- Team size for the project can consist of maximum 03 (three) students.
- Project plan along with division of work amongst teammates would have been prepared and got certified by the head of the college/department within a maximum of 10 (ten) days of the start of the project.
- Student must not pay any fee whatsoever to the company where he/she is selected for project.
- Internal guides must devote the time allocated as per the time table to guide the students for the project the time allocation will be in accordance with the scheme for 6th semester project as given.
- 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. It should also include a "Certificate of Completion" from the company.
- The report should be printed in colour and or greyscale and should be properly bound in spiral or hard cover.
- A copy as specified above has to be submitted at the time of external examination.
- The format of the external examination would consist of following components:

Sr.	Component	Weightage
1.	Explanation of Project	20 %
2.	Explanation of Code – Database	20 %
3.	Documentation (Report)	20 %
4.	Viva-Voce	40 %

- Above structure may be followed by the colleges during the internal examination.

Krantiguru Shyamji Krishna Verma Kachchh University
Master of Science (Information Technology)
Semester: IV

<table>
<tr><td colspan="3">Paper Code : CCCS401</td><td rowspan="2">Total Credit : 24
Total Marks : 420</td></tr>
<tr><td colspan="3">Title of Paper: Industrial Project</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td>Unit</td><td colspan="2">Description</td><td>Total Marks</td></tr>
<tr><td rowspan="4"></td><td>Q.1 Explanation of Project</td><td>80</td><td rowspan="4">420</td></tr>
<tr><td>Q.2 Explanation of Code - Database</td><td>80</td></tr>
<tr><td>Q.3 Documentation – Report</td><td>80</td></tr>
<tr><td>Q.4 Viva – Voce</td><td>180</td></tr>
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