

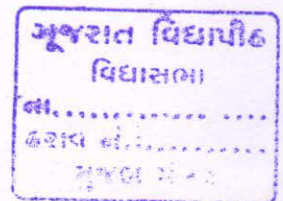
Gujarat Vidyapith
Department of Computer Sc.
(Faculty of Management and Technology)

M.Phil. Course work

ક્રમ	પ્રશ્નપત્ર નં	પ્રશ્નપત્ર નામ	ગુણ
1	MPhil-CS01	Research Methodology & Statistical Methods(સંશોધનનું પદ્ધતિ શાસ્ત્ર અને આંકડાશાસ્ત્રીય પદ્ધતિઓ)	100
2	MPhil-CS02	Application of Computer in Research (સંશોધનમાં કોમ્પ્યુટરનું ઉપયોજન)	50
3	MPhil-CS03	IPR, Datamining , Plagiarism	50
4	MPhil-CS04	Elective (વૈકલ્પિક)	100
		MPhil-CS04- Cyber Security (Elective -I)	
		MPhil-CS04 - Data Warehouse and Mining (Elective-II)	
		MPhil-CS04- Machin Learning (Elective -III)	
5		Lituration Review (સાહિત્ય સમીક્ષા)	

Ph. D. Course work

ક્રમ	પ્રશ્નપત્ર નં	પ્રશ્નપત્ર નામ	ગુણ
1	Phd-CS01	Research Methodology & Statistical Methods(સંશોધનનું પદ્ધતિ શાસ્ત્ર અને આંકડાશાસ્ત્રીય પદ્ધતિઓ)	100
2	Phd-CS02	Application of Computer in Research (સંશોધનમાં કોમ્પ્યુટરનું ઉપયોજન)	50
3	Phd-CS03	IPR, Datamining , Plagiarism	50
4		Lituration Review (સાહિત્ય સમીક્ષા)	



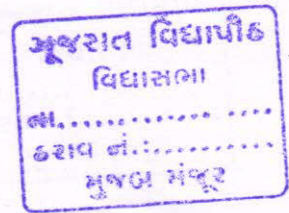
Gujarat Vidyapith
Department of Computer Sc.
(Faculty of Management and Technology)

M.Phil. Course work

ક્રમ	પ્રશ્નપત્ર નં	પ્રશ્નપત્ર નામ	ગુણ	કેડીટ
1	MPhil-CS01	Research Methodology & Statistical Methods(સંશોધનનું પદ્ધતિ શાસ્ત્ર અને આંકડાશાસ્ત્રીય પદ્ધતિઓ)	100	4
2	MPhil-CS02	Application of Computer in Research (સંશોધનમાં કોમ્પ્યુટરનું ઉપયોજન)	50	2+2
3	MPhil-CS03	IPR, Datamining , Plagiarism	50	2
4	MPhil-CS04	Elective (વૈકલ્પિક)	100	3
		MPhil-CS04- Cyber Security (Elective –I)		
		MPhil-CS04 - Data Warehouse and Mining (Elective-II)		
		MPhil-CS04- Machin Learning (Elective –III)		
5		Liturature Review (સાહિત્ય સમીક્ષા)		

Ph. D. Course work

ક્રમ	પ્રશ્નપત્ર નં	પ્રશ્નપત્ર નામ	ગુણ	કેડીટ
1	Phd-CS01	Research Methodology & Statistical Methods(સંશોધનનું પદ્ધતિ શાસ્ત્ર અને આંકડાશાસ્ત્રીય પદ્ધતિઓ)	100	4
2	Phd-CS02	Application of Computer in Research (સંશોધનમાં કોમ્પ્યુટરનું ઉપયોજન)	50	2+2
3	Phd-CS03	IPR, Datamining , Plagiarism	50	2
4		Liturature Review (સાહિત્ય સમીક્ષા)		



પ્રશ્નપત્ર

Research Methodology and Statistical Methods

કુલ ક્રેડીટ - ૪

M.Phil. CS-01

Ph.D. CS-01

Research Methodology and Statistical Methods માંથી વિદ્યાર્થીએ ૩(ત્રણ) અથવા ૩(ત્રણ)થી વધારે દિવસનો Research Methodology વિષય સંદર્ભનો વર્કશોપ કરવાનો સહેશે જેના ૨ ક્રેડીટ મળશે

પ્રશ્નપત્ર

Application of Computer in Research

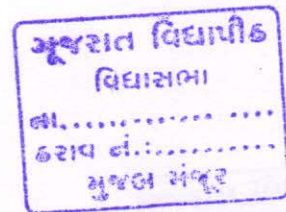
કુલ ક્રેડીટ - ૨ (સૈધાંતિક)

M.Phil. CS-02

+ ૨ (પ્રાયોગીક)

Ph.D. CS-02

Application of Computer in Research આ વિષયમાં વિદ્યાર્થીએ ૨(બે) ક્રેડીટ સૈધાંતિક અને ૨(બે) ક્રેડીટનું પ્રાયોગીક એમ મળી કુલ ૪ ક્રેડીટ મેળવવાના રહેશે. જેમાં વર્ષ ૨૦૧૭-૧૮ માટે R-language અને તેનું પ્રયોગીક કાર્ય કરવાનું રહેશે





Gujarat Vidyapith
Department of Computer Sc.
(Faculty of Management and Technology)

MPhil Course Work
MPhil-CS01- Research Methodology and Statistical Methods
સંશોધનનું પદ્ધતિ શાસ્ત્ર અને આંકડાશાસ્ત્રીય પદ્ધતિઓ

(Effective from JUNE - 2017)

Credits:	4 (2+2*)
Objective:	<ul style="list-style-type: none">• Introduce the concept Of Scientific Research and the methods of conducting Scientific Enquiry.• To Student can learn about aims, objectives research and reasons for doing research.• To learn the applications of research, characteristics and requirements of the research process• Introduce The Statistical Tools Of Data Analysis
Note :	*2 Credits for workshop (min 3 days)

UNIT - I

An Introduction: Research Methodology

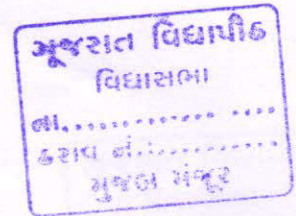
- Meaning of Research
- Objectives of Research
- Motivation in Research
- Types of Research
- Research Approaches
- Significance of Research
- Research Methods versus Methodology
- Research and Scientific Method
- Importance of Knowing How Research is Done
- Research Process
- Criteria of Good Research

Defining the Research Problem

- What is a Research Problem?
- Selecting the Problem
- Necessity of Defining the Problem
- Formulating a research problem
- Technique Involved in Defining a Problem

Research Design

- Meaning of Research Design
- Need for Research Design



Mphil. Course work [1/4] [2017]



- Features of a Good Design
- Important Concepts of Research Design
- Different Research Designs
- Basic Principles of Experimental Designs

Sampling Design

- Census and Sample Survey
- Implications of a Sample Design
- Steps in Sampling Design
- Criteria of Selecting a Sampling Procedure
- Characteristics of a Good Sample Design
- Types of Sample Designs
- Procedure of Selecting a Random Sample
- Random Sample from an Infinite Universe and Random Sampling Designs

Measurement and Scaling Techniques

- Measurement in Research
- Measurement Scales
- Sources of Error in Measurement
- Tests of Sound Measurement
- Technique of Developing Measurement Tools
- Scaling and Meaning of Scaling
- Bases of Scale Classification
- Important Scaling Techniques and Scale Construction Techniques

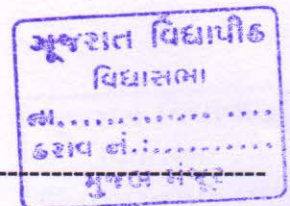
UNIT - II

Methods of Data Collection

- Collection of Primary Data
- Observation Method
- Interview Method
- Questionnaires Method
- Schedules Method
- Difference between Questionnaires and Schedules
- Other Methods of Data Collection
- Collection of Secondary Data
- Case Study Method
- Selection of Appropriate Method for Data Collection
- Difference between Survey and Experiment 120

Processing and Analysis of Data

- Processing Operations
- Some Problems in Processing
- Elements/Types of Analysis
- Statistics in Research
- Measures of Central Tendency





- Measures of Dispersion
- Measures of Asymmetry (Skewness)
- Measures of Relationship
- Simple Regression Analysis
- Multiple Correlation and Regression
- Partial Correlation
- Association in Case of Attributes
- Other Measures

Sampling Fundamentals

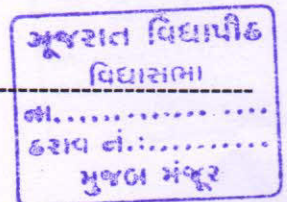
- Need for Sampling
- Some Fundamental Definitions
- Important Sampling Distributions
- Central Limit Theorem
- Sampling Theory
- A-test
- Concept of Standard Error and Estimation
- Estimating the Population Mean (m)
- Estimating Population Proportion
- Sample Size and its Determination
- Determination of Sample Size through the Approach Based on Precision Rate and Confidence Level
- Determination of Sample Size through the Approach Based on Bayesian Statistics

UNIT - III

Hypotheses and Hypothesis Testing

- What is a Hypothesis?
- Basic Concepts Concerning Testing of Hypotheses
- Procedure for Hypothesis Testing
- Measuring the Power of a Hypothesis Test
- Tests of Hypotheses
- Important Parametric Tests
- Hypothesis Testing of Means
- Hypothesis Testing for Differences between Means
- Hypothesis Testing for Comparing Two Related Samples
- Hypothesis Testing of Proportions
- Hypothesis Testing for Difference between Proportions
- Hypothesis Testing for Comparing a Variance to Some Hypothesized Population Variance
- Testing the Equality of Variances of Two Normal Populations
- Hypothesis Testing of Correlation Coefficients
- Limitations of the Tests of Hypotheses
- Chi-square Test

Mphil. Course work [3/4] [2017]





- Chi-square as a Test for Comparing Variance
- Chi-square as a Non-parametric Test 236
- Conditions for the Application of c2 Test
- Steps Involved in Applying Chi-square Test
- Analysis of Variance and Covariance
- Analysis of Variance (ANOVA)
- What is ANOVA?
- The Basic Principle of ANOVA
- ANOVA Technique
- One-way ANOVA and Two-way ANOVA

Multivariate Analysis Techniques

- Multivariate Techniques
- Characteristics and Applications
- Classification of Multivariate Techniques
- Variables in Multivariate Analysis
- Important Multivariate Techniques
- Important Methods of Factor Analysis
- Rotation in Factor Analysis
- R-type and Q-type Factor Analyses
- Path Analysis

UNIT - IV

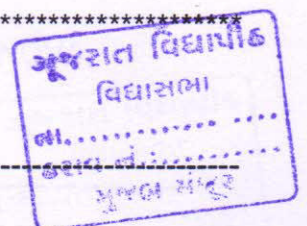
Interpretation and Report Writing

- Meaning of Interpretation
- Why Interpretation?
- Technique of Interpretation
- Precaution in Interpretation
- Significance of Report Writing
- Different Steps in Writing Report
- Structure/Layout and Components of Research Report
- Types of Reports
- Characteristics of Good Research Report
- Pictures and Graphs
- Oral Presentation
- Mechanics of Writing a Research Report
- Precautions for Writing Research Reports

Books:-

Research Methodology: Methods and Techniques by C.R. Kothari New Age International Pvt. Ltd.

*****End of MPhil-CS01*****





Gujarat Vidyapith
Department of Computer Sc.
(Faculty of Management and Technology)

M.Phil. Course work
MPhil-CS02- Application of Computer in Research

સંશોધનમાં કોમ્પ્યુટરનું ઉપયોજન

(Effective from JUNE - 2017)

Credits:	2+2
Overview of Course:	<p>R is an open source statistical programming language. It rapidly becoming the leading language in data science and statistics.</p> <p>This course will help students to understand the R programming and statistical analysis with R. Course divided in to theory as well as practical sessions. It covers starting form R basic syntax, variables, basic operations, data structures and graphical and data visualizations capabilities of R, in the final section, students will perform Statistical Analysis with R as a prat of practical.</p>
Total Marks	Theory 25 Marks + Practical 25 Marks

UNIT - I

- Introduction to R
 - The R Environment, R Packages, Basics of R
- Advanced Data Structures
 - Data.frames , Lists, Matrices, Arrays
- Reading Data into R
 - Reading CSVs, Excel Data, Reading form Databases, Data from other Statistical tools
 - R Binary files, Data Included with R, Extract Data from web sites
- Statistical Graphics
 - Basic Graphics , Ggplot2

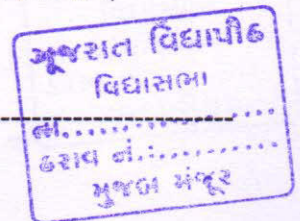
UNIT - II

- Writing R functions
- Control Statements
- Loops, the Un-R way to literate
- Group Manipulation
- Data Reshaping
- Manipulating string

UNIT - III

- Probability Distribution
 - Normal distribution, Binomial distribution, Poisson distribution
- Basic Statics
 - Summary Statistics, correlation and covariance, T-test, ANOVA,
- Hypothesis Testing

MPhil Course work [1/2] [2017]





Practical

LAB - Application of Computer in Research

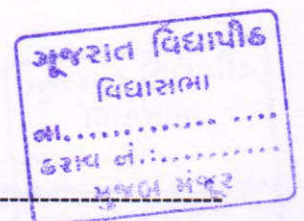
Books:-

1. Mark Gardener, "Beginning R The Statistical Programming Language",.. wrox
2. Jared P. Lander , "R for Everyone Advance analytics and Graphics", ADDISON Wesley
3. John M. Quick , "Statistical Analysis with R", PACT

Web resources:-

1. <https://www.r-project.org/>

*****End of MPhil-CS02*****





Gujarat Vidyapith
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(Faculty of Management and Technology)

M.Phil. Course work
MPHil-CS04- Cyber Security (Elective –I)
सायबर सीक्युरीटी (वैकल्पिक-I)

(Effective from JUNE - 2017)

Credits:	3
Objective:	To understand the concepts of Cybercrimes, Cyber Forensic and Cyber Security
Total Marks:	

UNIT - I

Introduction to Cyber Crimes:

- Definition and evolution of Cyber Crimes
- Cybercrime and Information Security

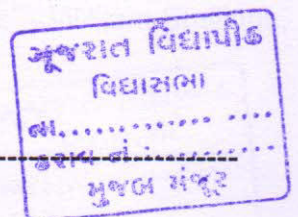
Classifications of Cybercrimes:

- Hacking
- E-Mail Spoofing
- Spamming
- Cracking
- Forgery
- Virus Attacks
- Software Piracy
- Intellectual property
- E-Mail Bombing/Mail Bombs
- Network Intrusions
- Password, Sniffing
- Credit Card Frauds
- attacks on mobile phones

UNIT - II

Tools and Methods Used in Cybercrime:

- Proxy servers and Anonymizers
- Phishing
- Password cracking
- Key loggers and Spywares





- Virus and Worms
- Trojan Horse and Backdoors
- Steganography SQL injection
- Buffer overflow
- attacks on wireless networks

UNIT - III

Understanding Computer Forensic:

- Background of Cyber Forensic
- Forensic analysis of e-mail
- Digital forensic life cycle
- Network forensic
- Relevance of OSI 7 layer model to computer forensic

Understanding Forensic of Mobile Devices :

- Understanding cell phone working characteristics
- hand-held devices and digital forensic
- toolkit for hand-held devices
- forensic of digital music devices

UNIT - IV

Cyber Security :

- Organizational implications
- cost of cybercrimes and IPR issues
- Web threats for organizations
- Social media marketing
- Security and Privacy implications
- protecting privacy in organization
- forensic best practices for organizations

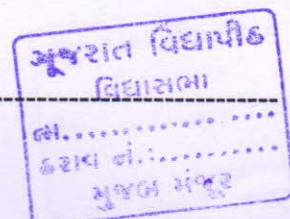
Cyber Law :

- Why cyber law
- the Indian IT act
- Digital signature & Indian IT act
- Cybercrime and Punishment

Book for Study:

1. "Cyber Security" – Nina Godbole and Sunit Belapur, Wiley
2. "Cryptography and network Security – Principles and Practices" - William Stallings, Prentice Hall (Pearson Education), Fourth Edition, 2006.

MPhil Course work [2/3] [2017]





3. "Cyber Security Essentials" - James Graham, Richard Howard, Ryan Olsan, CRC Press
4. "CYBER FORENSICS: A Field Manual for Collecting, Examining, and Preserving Evidence of Computer Crimes" - Albert J. Marcella, Jr. Doug Menendez, Auerbach Publications

***** End of MPhil-CS04 (Elective – I) *****

UNIT I

- Introduction, Operational Data Stores (ODS)
- Enterprise Transformation: Leading (ETL)
- Data Warehouses
- Design Issues
- Guidelines for Data Warehouse Implementation
- Data Warehouse Metadata

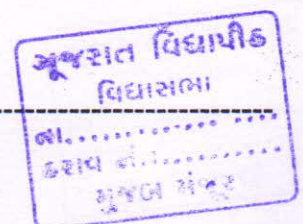
UNIT II

- Introduction, Characteristics of OLAP system
- Multidimensional view and Data cube
- Data Cube implementations
- Data Cube operations
- Introduction of OLAP and overview on OLAP Software

UNIT III

- Introduction
- Challenges
- Data Mining Tasks
- Types of Data
- Data Preprocessing
- Measures of Similarity and Dissimilarity
- Data Mining Applications

MPhil Course work [3/3] [2017]





Gujarat Vidyapith
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(Faculty of Management and Technology)

M.Phil. Course work
MPhil-CS04 - Data Warehouse and Mining (Elective-II)

ડેટા વેરહાઉસ અને માઈનીંગ(વૈકલ્પિક-II)

(Effective from JUNE - 2017)

Credits:	3
Objective:	
Prerequisite:	

UNIT - I

Data Warehousing

- Introduction, Operational Data Stores (ODS)
- Extraction Transformation Loading (ETL)
- Data Warehouses
- Design Issues
- Guidelines for Data Warehouse Implementation
- Data Warehouse Metadata

UNIT - II

Online Analytical Processing (OLAP)

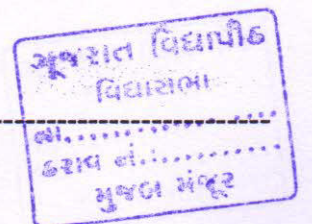
- Introduction, Characteristics of OLAP systems
- Multidimensional view and Data cube
- Data Cube Implementations
- Data Cube operations
- Implementation of OLAP and overview on OLAP Softwares.

UNIT - III

Data Mining

- Introduction
- Challenges
- Data Mining Tasks
- Types of Data
- Data Preprocessing
- Measures of Similarity and Dissimilarity
- Data Mining Applications

Mphil. Course work [1/2] [2017]





UNIT - IV

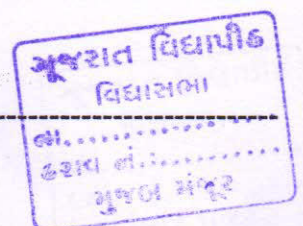
Association Analysis: Basic Concepts and Algorithms

- Frequent Item set Generation
- Rule Generation
- Compact Representation of Frequent Item sets
- Alternative methods for generating Frequent Item sets
- FP Growth Algorithm
- Evaluation of Association Patterns

Book:

Data Mining – Concepts and Techniques by Jiawei Han and Micheline Kamber
Published by Elsevier.

*****End of MPhil-CS04 (Elective -II)*****





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M.Phil. Course work
MPhil-CS04- Machine Learning (Elective –III)
મશીન લર્નિંગ (વેકલ્યુક-III)

(Effective from JUNE - 2017)

Credits:	3
Objective:	This course introduces several fundamental concepts and methods for machine learning. The objective is to familiarize the students with some basic learning algorithms and techniques and their applications, so that student can be able to understand the basic theory underlying machine learning, formulate machine learning problems corresponding to different applications. Student can be able to apply machine learning algorithms to solve problems of moderate complexity.
Total Marks:	Theory 75 Marks + Practical 25 Marks

UNIT - I

- Introduction to machine learning problems, scope and mathematical tools required, selection of machine learning algorithm.

UNIT - II

- Regression and classification problems, different classification techniques, linear and logistic regression, Supervised and unsupervised learning algorithms, K-nn, K-mean clustering and probabilistic learning approaches, classification based on decision tree and rules.

UNIT - III

- Forecasting numeric data, data regression methods, collaborative learning.

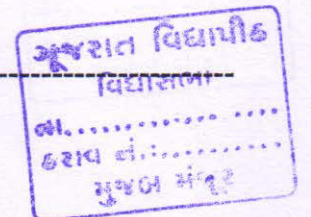
UNIT - IV

- Black box methods for classification, artificial neural networks, support vector machine, OCR by using SVM.

UNIT - V

- Evaluating model performance, improving model performance, advanced topics in machine learning.

Mphil. Course work [1/2] [2017]





Practical

LAB - Machine Learning (Elective –III)

Text Books:

1. Brett Lantz, "Machine Learning with R", 2nd Edition, Packt publishing, 2015.
2. Jared P Lander "R for every one Advance Analytics and Graphics", Addison Wesley.

Reference Books:

1. Richard O. Duda, Peter E. Hart and David G. Stork, "Pattern Classification", 2nd Edition, John Wiley, 2006.
2. C. M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2009.
3. Pedregosa, Fabian, et al. "Scikit-learn: Machine learning in Python." Journal of Machine Learning Research 12.Oct (2011): 2825-2830.
4. Dr Mark Gardener, "Beginning R The Statistical Programming Language". Wrox.

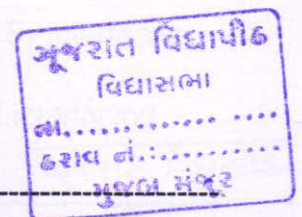
List of Experiments (Machine Learning using 'R')

1. Data import and visualization
2. Matrix operations and statistical computation
3. Linear Regression
4. Logistic Regression
5. Multi-class Classification and Neural Networks
6. Neural Networks Learning
7. Regularized Linear Regression and Bias v.s. Variance
8. Support Vector Machines
9. K-means Clustering and Principal Component Analysis
10. Anomaly Detection and Recommender Systems

*****End of MPhil-CS04 (Elective -III)*****

Unit - II

- Introduction to Python v. Language Syntax of Python, Data types, Operators, Control flow, strings, modules, packages, file handling, exceptions, etc.
- Python Expressions - ISDN, MAIL, HTTP, URL, SMTP, etc.
- GUI Frameworks: Tkinter and Tkinter - Application to Tkinter
- Programming - Python program with necessary PL with focus on GUI applications.





Gujarat Vidyapith
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M.Phil. Course work
MPhil-CS04- Internet of Things (Elective –IV)

ઇન્ટરનેટ ઓફ થીંગ્સ (વૈકલ્પિક-IV)

(Effective from JUNE - 2017)

Credits:	3
Objective:	
Total Marks:	

UNIT - I

- Introduction to Internet of Things –Definition and Characteristics of IoT
- Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs
- IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates
- Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

Unit - II

- IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT
- Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER

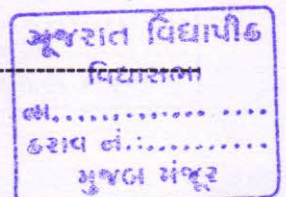
Unit - III

- Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling
- Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

Unit - IV

- IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C)
- Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

MPhil Course work [1/2] [2017]





Unit - V

- IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs
- Webserver – Web server for IoT, Cloud for IoT, Python web application framework
- Designing a RESTful web API

Text Book:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547

*****End of MPhil-CS04 (Elective -IV) *****

Unit I
An Introduction to Research Methodology

- Meaning of Research
- Objectives of Research
- Importance of Research
- Types of Research
- Research Methodologies
- Characteristics of Research
- Research Methods versus Methodology
- Research and Scientific Method
- Importance of Research in Research & Devt.
- Research Process
- Characteristics of Good Research

Defining the Research Problem

- What is a Research Problem?
- Defining the Problem
- Importance of Defining the Problem
- Formulating a research problem
- Techniques involved in Defining a Problem

Research Design

- Meaning of Research Design
- Needs for Research Design

ગુજરાત વિદ્યાપીઠ
વિદ્યારાજા
ભા.
કક્કા નં.:
મુલક મુદ્ર



Gujarat Vidyapith
Department of Computer Sc.
(Faculty of Management and Technology)

Ph.D.-Course Work
Phd-CS01- Research Methodology and Statistical Methods
સંશોધનનું પદ્ધતિ શાસ્ત્ર અને આંકડાશાસ્ત્રીય પદ્ધતિઓ7y

(Effective from JUNE - 2017)

Credits:	4 (2+2*)
Objective:	<ul style="list-style-type: none">• Introduce the concept Of Scientific Research and the methods of conducting Scientific Enquiry.• To Student can learn about aims, objectives research and reasons for doing research.• To learn the applications of research, characteristics and requirements of the research process• Introduce The Statistical Tools Of Data Analysis
Note :	*2 Credits for workshop (min 3 days)

UNIT - I

An Introduction: Research Methodology

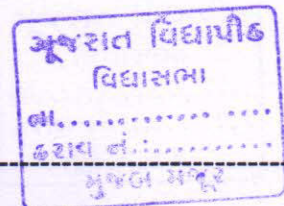
- Meaning of Research
- Objectives of Research
- Motivation in Research
- Types of Research
- Research Approaches
- Significance of Research
- Research Methods versus Methodology
- Research and Scientific Method
- Importance of Knowing How Research is Done
- Research Process
- Criteria of Good Research

Defining the Research Problem

- What is a Research Problem?
- Selecting the Problem
- Necessity of Defining the Problem
- Formulating a research problem
- Technique Involved in Defining a Problem

Research Design

- Meaning of Research Design
- Need for Research Design





- Features of a Good Design
- Important Concepts of Research Design
- Different Research Designs
- Basic Principles of Experimental Designs

Sampling Design

- Census and Sample Survey
- Implications of a Sample Design
- Steps in Sampling Design
- Criteria of Selecting a Sampling Procedure
- Characteristics of a Good Sample Design
- Types of Sample Designs
- Procedure of Selecting a Random Sample
- Random Sample from an Infinite Universe and Random Sampling Designs

Measurement and Scaling Techniques

- Measurement in Research
- Measurement Scales
- Sources of Error in Measurement
- Tests of Sound Measurement
- Technique of Developing Measurement Tools
- Scaling and Meaning of Scaling
- Bases of Scale Classification
- Important Scaling Techniques and Scale Construction Techniques

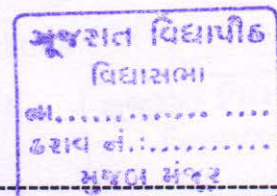
UNIT - II

Methods of Data Collection

- Collection of Primary Data
- Observation Method
- Interview Method
- Questionnaires Method
- Schedules Method
- Difference between Questionnaires and Schedules
- Other Methods of Data Collection
- Collection of Secondary Data
- Case Study Method
- Selection of Appropriate Method for Data Collection
- Difference between Survey and Experiment 120

Processing and Analysis of Data

- Processing Operations
- Some Problems in Processing
- Elements/Types of Analysis
- Statistics in Research





- Measures of Central Tendency
- Measures of Dispersion
- Measures of Asymmetry (Skewness)
- Measures of Relationship
- Simple Regression Analysis
- Multiple Correlation and Regression
- Partial Correlation
- Association in Case of Attributes
- Other Measures

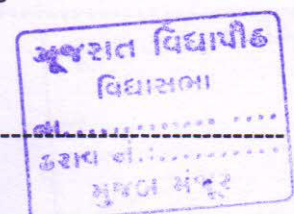
Sampling Fundamentals

- Need for Sampling
- Some Fundamental Definitions
- Important Sampling Distributions
- Central Limit Theorem
- Sampling Theory
- A-test
- Concept of Standard Error and Estimation
- Estimating the Population Mean (μ)
- Estimating Population Proportion
- Sample Size and its Determination
- Determination of Sample Size through the Approach Based on Precision Rate and Confidence Level
- Determination of Sample Size through the Approach Based on Bayesian Statistics

UNIT - III

Hypotheses and Hypothesis Testing

- What is a Hypothesis?
- Basic Concepts Concerning Testing of Hypotheses
- Procedure for Hypothesis Testing
- Measuring the Power of a Hypothesis Test
- Tests of Hypotheses
- Important Parametric Tests
- Hypothesis Testing of Means
- Hypothesis Testing for Differences between Means
- Hypothesis Testing for Comparing Two Related Samples
- Hypothesis Testing of Proportions
- Hypothesis Testing for Difference between Proportions
- Hypothesis Testing for Comparing a Variance to Some Hypothesized Population Variance
- Testing the Equality of Variances of Two Normal Populations
- Hypothesis Testing of Correlation Coefficients
- Limitations of the Tests of Hypotheses





- Chi-square Test
- Chi-square as a Test for Comparing Variance
- Chi-square as a Non-parametric Test 236
- Conditions for the Application of χ^2 Test
- Steps Involved in Applying Chi-square Test
- Analysis of Variance and Covariance
- Analysis of Variance (ANOVA)
- What is ANOVA?
- The Basic Principle of ANOVA
- ANOVA Technique
- One-way ANOVA and Two-way ANOVA

Multivariate Analysis Techniques

- Multivariate Techniques
- Characteristics and Applications
- Classification of Multivariate Techniques
- Variables in Multivariate Analysis
- Important Multivariate Techniques
- Important Methods of Factor Analysis
- Rotation in Factor Analysis
- R-type and Q-type Factor Analyses
- Path Analysis

UNIT - IV

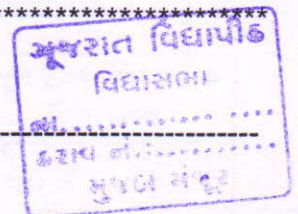
Interpretation and Report Writing

- Meaning of Interpretation
- Why Interpretation?
- Technique of Interpretation
- Precaution in Interpretation
- Significance of Report Writing
- Different Steps in Writing Report
- Structure/Layout and Components of Research Report
- Types of Reports
- Characteristics of Good Research Report
- Pictures and Graphs
- Oral Presentation
- Mechanics of Writing a Research Report
- Precautions for Writing Research Reports

Books:-

- Research Methodology: Methods and Techniques by C.R. Kothari New Age International Pvt. Ltd.

*****End of Phd-CS01*****





Gujarat Vidyapith
Department of Computer Sc.
(Faculty of Management and Technology)

Ph.D. Course work
Phd-CS02- Application of Computer in Research

સંશોધનમાં કોમ્પ્યુટરનું ઉપયોજન

(Effective from JUNE - 2017)

Credits:	2+2
Overview of Course:	<p>R is an open source statistical programming language. It rapidly becoming the leading language in data science and statistics.</p> <p>This course will help students to understand the R programming and statistical analysis with R. Course divided in to theory as well as practical sessions. It covers starting form R basic syntax, variables, basic operations, data structures and graphical and data visualizations capabilities of R, in the final section, students will perform Statistical Analysis with R as a prat of practical.</p>
Total Marks	Theory 75 Marks + Practical 25 Marks

UNIT - I

- Introduction to R
 - The R Environment, R Packages, Basics of R
- Advanced Data Structures
 - Data.frames , Lists, Matrices, Arrays
- Reading Data into R
 - Reading CSVs, Excel Data, Reading form Databases, Data from other Statistical tools
 - R Binary files, Data Included with R, Extract Data from web sites
- Statistical Graphics
 - Basic Graphics , Ggplot2

UNIT - II

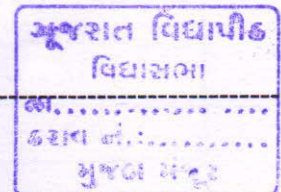
- Writing R functions
- Control Statements
- Loops, the Un-R way to literate
- Group Manipulation
- Data Reshaping
- Manipulating string

UNIT - III

Probability Distribution

- Normal distribution, Binomial distribution, Poisson distribution
- Basic Statics
 - Summary Statistics, correlation and covariance, T-test, ANOVA,
- Hypothesis Testing

Ph.D. Course work [1/2] [2017]





Practical

LAB - Application of Computer in Research

Books:-

1. Mark Gardener, "Beginning R The Statistical Programming Language", .. wrox
2. Jared P. Lander , "R for Everyone Advance analytics and Graphics", ADDISON Wesley
3. John M. Quick , "Statistical Analysis with R", PACT

Web resources:-

1. <https://www.r-project.org/>

*****End of Phd-CS02*****

